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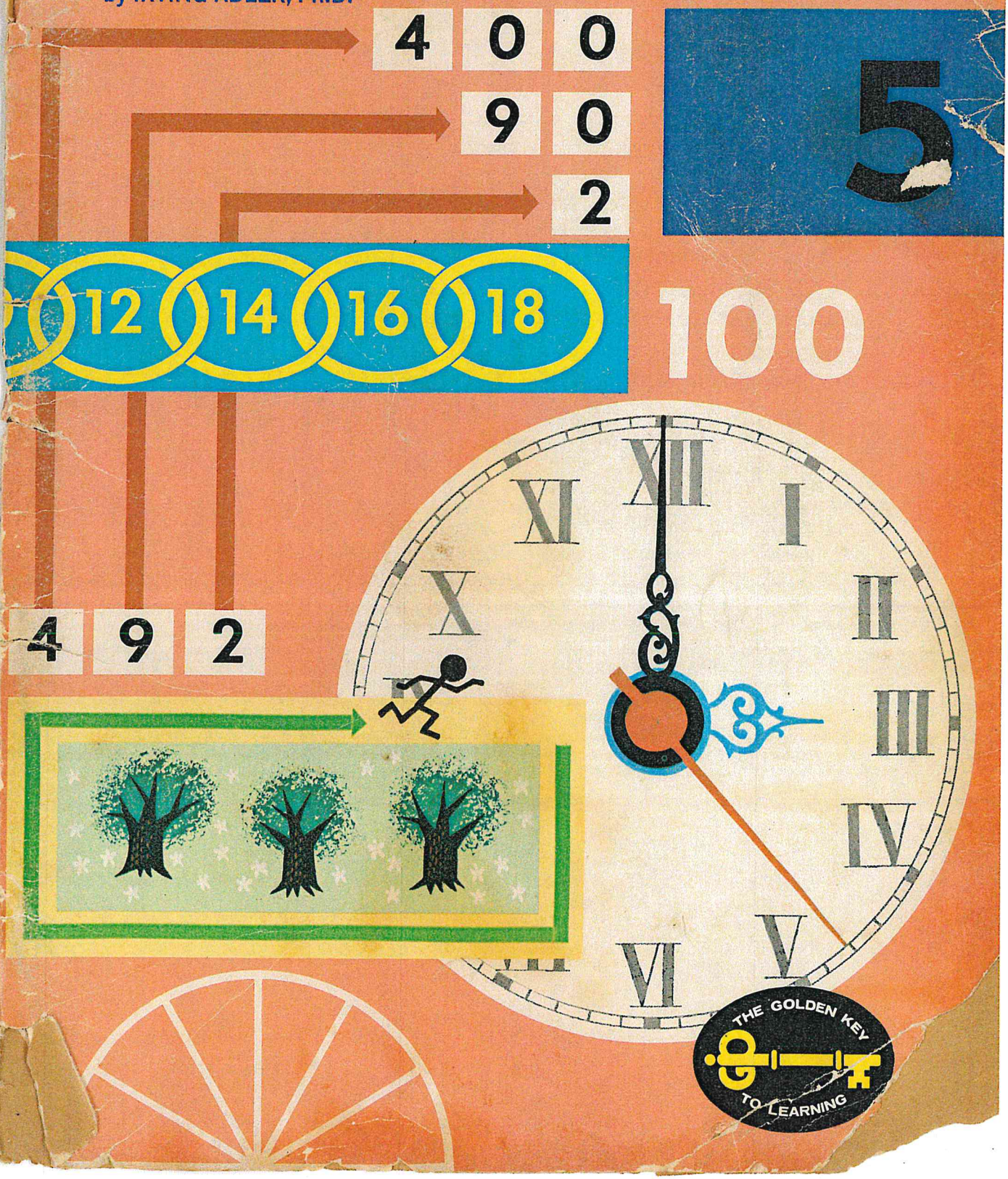
MATHEMATICS—GRADE 5

Working with Large Numbers and Common Fractions

A Workbook with Self-Teaching Text and Learning Exercises

by IRVING ADLER, Ph.D.



THE GOLDEN KEY TO LEARNING

TO THE PARENT AND TEACHER

MATHEMATICS—GRADE 5 is based on a careful study of the methods used to teach mathematics both in this country and abroad. The aim is to develop understanding as a foundation for skill. The book includes the best practices found anywhere and has the freshness and originality that are characteristic of all the author's books.

This volume extends to large numbers the basic concepts developed in Books 1, 2, 3, and 4. It also develops the meaning of fractions, changing fractions to lower or higher terms, and the addition and subtraction of fractions.

The book opens with a brief review of the basic multiplication and division facts, and of addition and subtraction of numbers less than 100. Emphasis is put on thinking out answers, so that the results may be understood as well as remembered. The Readiness Tests on pages 11 and 12 will show whether the child is prepared to go on to the new material, or needs more intensive reteaching from Books 3 and 4.

The algorithms used for multiplication and division are slight modifications of the traditional algorithms. The changes are designed to reveal more clearly the meaning of the separate steps that are carried out.

Other concepts and skills developed include: approximation and estimation; Roman numerals through 500; money equivalents and making change up to $10; the concept of average; and units of time, weight, and length. Problems and test exercises are provided at frequent intervals.

ABOUT THE AUTHOR

Irving Adler received his Ph.D. in pure mathematics at Columbia University. He was a teacher in the New York schools for twenty years, including six years as chairman of a high-school mathematics department. Dr. Adler has taught at Columbia University and Bennington College, and was the keynote speaker at the Washington conference of state supervisors of mathematics, called by the U.S. Office of Education in June, 1961. He is the author of about fifty books on mathematics, science, and education, and co-author of thirty more.

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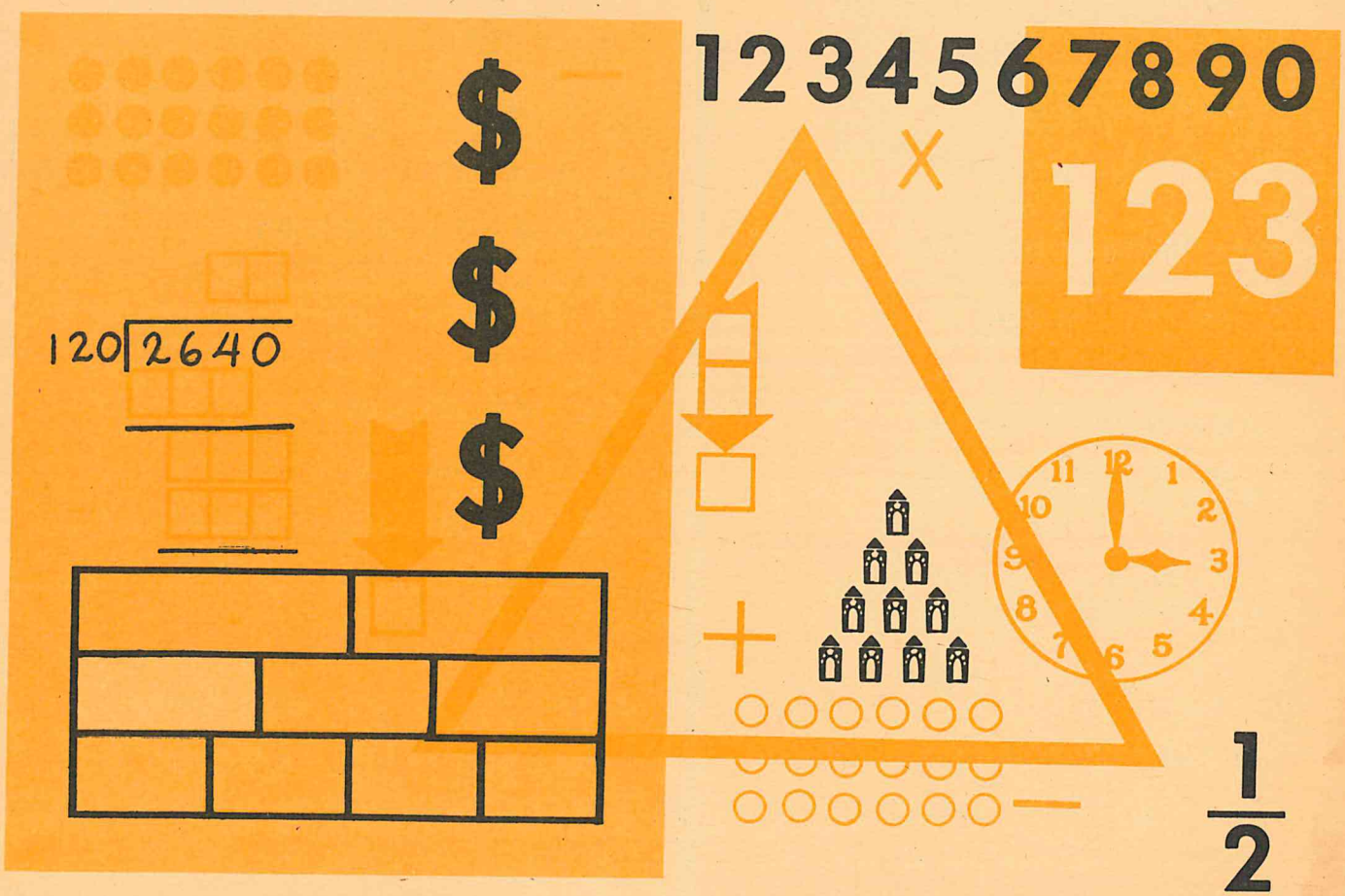
Author of *The Giant Golden Book of Mathematics*, *The New Mathematics*, and *Magic House of Numbers*

Illustrated by Lowell Hess



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Thinking Out Multiplication

$7 \times 2 = (6 \times 2) + 2$

$= \square + 2 = \square$

$7 \times 3 = (6 \times 3) + 3$

$= \square + 3 = \square$

$8 \times 2 = (4 \times 2) + (4 \times 2)$

$= \square + \square = \square$

$8 \times 3 = (4 \times 3) + (4 \times 3)$

$= \square + \square = \square$

$9 \times 2 = (8 \times 2) + 2$

$= \square + 2 = \square$

$9 \times 3 = (8 \times 3) + 3$

$= \square + 3 = \square$

$10 \times 2 = 2 \times 10 = 2 \text{ tens} = \square$

$10 \times 3 = 3 \times 10 = 3 \text{ tens} = \square$

$11 \times 2 = (10 \times 2) + 2$

$= \square + 2 = \square$

$11 \times 3 = (10 \times 3) + 3$

$= \square + 3 = \square$

$12 \times 2 = (6 \times 2) + (6 \times 2)$

$= \square + \square = \square$

$12 \times 3 = (6 \times 3) + (6 \times 3)$

$= \square + \square = \square$

$7 \times 4 = (6 \times 4) + 4$

$= \square + 4 = \square$

$7 \times 5 = (6 \times 5) + 5$

$= \square + 5 = \square$

$8 \times 4 = (4 \times 4) + (4 \times 4)$

$= \square + \square = \square$

$8 \times 5 = (4 \times 5) + (4 \times 5)$

$= \square + \square = \square$

$9 \times 4 = (8 \times 4) + 4$

$= \square + 4 = \square$

$9 \times 5 = (8 \times 5) + 5$

$= \square + 5 = \square$

$10 \times 4 = 4 \times 10 = 4 \text{ tens} = \square$

$10 \times 5 = 5 \times 10 = 5 \text{ tens} = \square$

$11 \times 4 = (10 \times 4) + 4 = \square$

$11 \times 5 = (10 \times 5) + 5 = \square$

$12 \times 4 = (6 \times 4) + (6 \times 4) = \square$

$12 \times 5 = (6 \times 5) + (6 \times 5) = \square$

$7 \times 2 = \square$	$32 \div 4 = \square$
$9 \times 5 = \square$	$35 \div 5 = \square$
$7 \times 3 = \square$	$27 \div 3 = \square$
$8 \times 5 = \square$	$40 \div 4 = \square$
$9 \times 3 = \square$	$28 \div 4 = \square$
$8 \times 2 = \square$	$24 \div 3 = \square$
$9 \times 4 = \square$	$30 \div 3 = \square$
$9 \times 2 = \square$	$40 \div 5 = \square$
$8 \times 3 = \square$	$18 \div 2 = \square$

Thinking Out Multiplication

$7 \times 6 = (6 \times 6) + 6$

$= \square + 6 = \square$

$7 \times 7 = (6 \times 7) + 7$

$= \square + 7 = \square$

$7 \times 8 = (6 \times 8) + 8$

$= \square + 8 = \square$

$7 \times 9 = (6 \times 9) + 9$

$= \square + 9 = \square$

$8 \times 6 = (4 \times 6) + (4 \times 6)$

$= \square + \square = \square$

$8 \times 7 = (4 \times 7) + (4 \times 7)$

$= \square + \square = \square$

$8 \times 8 = (4 \times 8) + (4 \times 8)$

$= \square + \square = \square$

$8 \times 9 = (4 \times 9) + (4 \times 9)$

$= \square + \square = \square$

$9 \times 6 = (8 \times 6) + 6$

$= \square + 6 = \square$

$9 \times 7 = (8 \times 7) + 7$

$= \square + 7 = \square$

$9 \times 8 = (8 \times 8) + 8$

$= \square + 8 = \square$

$9 \times 9 = (8 \times 9) + 9$

$= \square + 9 = \square$

$10 \times 6 = \square \times 10 = \square$

$10 \times 7 = \square \times 10 = \square$

$10 \times 8 = \square \times 10 = \square$

$10 \times 9 = \square \times 10 = \square$

$11 \times 6 = 60 + \square = \square$

$11 \times 7 = 70 + \square = \square$

$11 \times 8 = \square + 8 = \square$

$11 \times 9 = \square + 9 = \square$

$12 \times 6 = 60 + 6 + 6 = \square$

$12 \times 7 = 70 + 7 + 7 = \square$

$12 \times 8 = \square + 8 + 8 = \square$

$12 \times 9 = \square + 9 + 9 = \square$

$8 \times 6 = \square$	$64 \div 8 = \square$
$7 \times 7 = \square$	$81 \div 9 = \square$
$8 \times 9 = \square$	$63 \div 7 = \square$
$9 \times 6 = \square$	$48 \div 6 = \square$
$7 \times 6 = \square$	$56 \div 8 = \square$
$8 \times 8 = \square$	$49 \div 7 = \square$
$9 \times 7 = \square$	$72 \div 8 = \square$
$7 \times 8 = \square$	$72 \div 9 = \square$
$9 \times 8 = \square$	$63 \div 9 = \square$
$7 \times 9 = \square$	$54 \div 6 = \square$
$8 \times 7 = \square$	$56 \div 7 = \square$
$9 \times 9 = \square$	$42 \div 6 = \square$

Readiness Tests

If you get more than 10 answers wrong on this page, you need more help with addition and subtraction. To get this help, use **Mathematics—Grade 3.**

Addition Test

9 + 4 =	7 + 8 =	6 + 5 =	9 + 7 =	7 + 4 =
8 + 5 =	6 + 8 =	8 + 7 =	8 + 9 =	9 + 0 =
7 + 9 =	5 + 6 =	9 + 2 =	5 + 8 =	9 + 6 =
4 + 8 =	8 + 4 =	6 + 9 =	7 + 7 =	9 + 3 =
7 + 5 =	5 + 9 =	8 + 6 =	3 + 9 =	6 + 7 =
2 + 9 =	5 + 7 =	8 + 3 =	9 + 8 =	9 + 5 =
4 + 7 =	3 + 8 =	8 + 8 =	0 + 8 =	6 + 6 =
7 + 6 =	0 + 7 =	4 + 9 =	6 + 0 =	9 + 9 =

Subtraction Test

16 − 7 =	14 − 8 =	14 − 5 =	11 − 2 =	14 − 9 =
12 − 6 =	15 − 9 =	17 − 8 =	12 − 5 =	13 − 6 =
12 − 4 =	15 − 8 =	11 − 8 =	11 − 7 =	13 − 4 =
15 − 6 =	16 − 8 =	12 − 3 =	14 − 7 =	16 − 9 =
12 − 7 =	11 − 4 =	11 − 6 =	13 − 5 =	12 − 9 =
12 − 8 =	15 − 7 =	17 − 9 =	11 − 5 =	13 − 8 =
9 − 9 =	13 − 9 =	11 − 9 =	13 − 7 =	8 − 0 =
7 − 0 =	11 − 3 =	6 − 6 =	18 − 9 =	14 − 6 =

Readiness Tests

If you get more than 10 answers wrong on this page, you need more help with multiplication and division. To get this help, use **Mathematics—Grade 4.**

Multiplication Test

6 × 6 =	5 × 7 =	7 × 1 =	5 × 8 =	6 × 5 =
8 × 4 =	6 × 8 =	7 × 6 =	7 × 3 =	9 × 4 =
6 × 9 =	7 × 2 =	5 × 9 =	6 × 7 =	8 × 1 =
7 × 7 =	7 × 4 =	9 × 6 =	8 × 3 =	1 × 7 =
9 × 2 =	7 × 8 =	9 × 1 =	9 × 8 =	7 × 5 =
7 × 9 =	8 × 5 =	8 × 8 =	1 × 9 =	9 × 7 =
9 × 5 =	0 × 5 =	9 × 3 =	9 × 9 =	8 × 2 =
8 × 7 =	8 × 0 =	8 × 9 =	8 × 6 =	1 × 8 =

Division Test

2 ⟌ 12 =	4 ⟌ 20 =	3 ⟌ 15 =
5 ⟌ 45 =	7 ⟌ 63 =	6 ⟌ 42 =
7 ⟌ 42 =	5 ⟌ 30 =	7 ⟌ 49 =
4 ⟌ 32 =	8 ⟌ 40 =	3 ⟌ 27 =
9 ⟌ 45 =	2 ⟌ 14 =	9 ⟌ 54 =
6 ⟌ 54 =	8 ⟌ 72 =	7 ⟌ 56 =
9 ⟌ 81 =	3 ⟌ 21 =	5 ⟌ 35 =
2 ⟌ 18 =	5 ⟌ 25 =	2 ⟌ 16 =
8 ⟌ 64 =	8 ⟌ 48 =	9 ⟌ 72 =
5 ⟌ 40 =	4 ⟌ 24 =	9 ⟌ 63 =
3 ⟌ 18 =	6 ⟌ 48 =	4 ⟌ 36 =
8 ⟌ 56 =	3 ⟌ 24 =	3 ⟌ 12 =
4 ⟌ 16 =	4 ⟌ 28 =	8 ⟌ 8 =

Three-Digit Numerals

In a three-digit numeral, the third digit from the right shows the number of hundreds.

2 4 7
- 2 hundreds = 2 0 0
- 4 tens = 4 0
- 7 ones = 7

247 means 2 hundreds + 4 tens + 7 ones.

To say 247 in words, say: Two hundred forty-seven.

7 0 3
- 7 hundreds = 7 0 0
- 0 tens = 0 0
- 3 ones = 3

In words: seven hundred three.

Show the meaning of each numeral and write it in words.

1 3 5
- hundred = ☐☐☐
- tens = ☐☐
- ones = ☐

In words: _____

5 8 9
- hundreds = ☐☐☐
- tens = ☐☐
- ones = ☐

In words: _____

4 0 6
- hundreds = ☐☐☐
- tens = ☐☐
- ones = ☐

In words: _____

Count by ones.

698 ☐ ☐ ☐ ☐

Count by twos.

498 ☐ ☐ ☐ ☐

Count by fives.

390 ☐ ☐ ☐ ☐

Count by tens.

260 ☐ ☐ ☐ ☐

Count by fiftys.

400 450 ☐ ☐ ☐

Count by hundreds.

110 210 ☐ ☐ ☐

Write each number in numerals.

two hundred seventy-five: ☐☐☐

four hundred fifty: ☐☐☐

seven hundred six: ☐☐☐

three hundred twelve: ☐☐☐

1 hundred = 10 tens

2 hundreds = ☐☐ tens

3 hundreds = ☐☐ tens

4 hundreds = ☐☐ tens

50 tens = 5 hundreds

60 tens = ☐ hundreds

70 tens = ☐ hundreds

80 tens = ☐ hundreds

90 tens = ☐ hundreds

Three-Digit Numerals

Exchange 1 hundred for 10 tens.

215 = 2 hundreds + 1 ten + 5 ones

= 1 hundred + 11 tens + 5 ones

365 = 3 hundreds + 6 tens + 5 ones

= 2 hundreds + ____ tens + 5 ones

429 = 4 hundreds + 2 tens + 9 ones

= 3 hundreds + ____ tens + 9 ones

532 = 5 hundreds + 3 tens + 2 ones

= ____ hundreds + 13 tens + 2 ones

617 = 6 hundreds + 1 ten + 7 ones

= ____ hundreds + 11 tens + 7 ones

256 = 2 hundreds + 5 tens + 6 ones

= ____ hundred + ____ tens + 6 ones

711 = 7 hundreds + 1 ten + 1 one

= ____ hundreds + ____ tens + 1 one

Exchange every hundred for 10 tens.

215 = 2 hundreds + 1 ten + 5 ones

= 21 tens + 5 ones

365 = 3 hundreds + 6 tens + 5 ones

= 36 tens + 5 ones

429 = 4 hundreds + 2 tens + 9 ones

= ____ tens + 9 ones

532 = 5 hundreds + 3 tens + 2 ones

= ____ tens + 2 ones

617 = 6 hundreds + 1 ten + 7 ones

= ____ tens + 7 ones

256 = 2 hundreds + 5 tens + 6 ones

= ____ tens + 6 ones

Thinking Out Addition

516 + 2 = 500 + 16 + 2

= 500 + 18 = 518

243 + 5 = 200 + 43 + 5

= 200 + ____ = ____

711 + 6 = 700 + 11 + 6

= 700 + ____ = ____

421 + 4 = 400 + 21 + 4

= 400 + ____ = ____

342 + 4 = ____ 485 + 3 = ____

284 + 9 = 200 + 84 + 9

= 200 + 93 = 293

234 + 8 = 200 + 34 + 8

= 200 + ____ = ____

517 + 5 = 500 + 17 + 5

= 500 + ____ = ____

419 + 6 = ____ 625 + 8 = ____

419 + 20 = 400 + (10 + 20) + 9

= 400 + 30 + 9 = 439

526 + 30 = ____ 410 + 60 = ____

618 + 40 = ____ 329 + 20 = ____

211 + 50 = ____ 706 + 80 = ____

218 + 100 = (200 + 100) + 18 = 318

218 + 200 = (200 + 200) + 18 = 418

218 + 300 = (200 + 300) + 18 = ____

372 + 400 = (300 + 400) + 72 = ____

481 + 200 = (400 + 200) + 81 = ____

Adding Numbers Written as Three-Digit Numerals

Examples

```
  416
+ 123
    9
```
Add the ones. 6 + 3 = 9

```
  416
+ 123
   39
```
Add the tens. 1 + 2 = 3

```
  416
+ 123
  539
```
Add the hundreds. 4 + 1 = 5

```
   1
  315
+ 149
    4
```
Add the ones. 5 + 9 = 14 = 1 ten + 4

```
   1
  315
+ 149
   64
```
Add the tens. 1 + 1 + 4 = 6

```
   1
  315
+ 149
  464
```
Add the hundreds. 3 + 1 = 4

```
  442
+ 173
    5
```
Add the ones. 2 + 3 = 5

```
   1
  442
+ 173
   15
```
Add the tens. 4 tens + 7 tens = 11 tens = 1 hundred + 1 ten

```
   1
  442
+ 173
 □15
```

```
   1
  285
+ 367
    2
```
Add the ones. 5 + 7 = 12 = 1 ten + 2

```
   11
  285
+ 367
   52
```
Add the tens. 1 ten + 8 tens + 6 tens = 15 tens = 1 hundred + 5 tens

```
   11
  285
+ 367
 □52
```

```
  317
+ 142
 □□□
```

```
  □
  516
+ 248
 □□□
```

```
  □
  283
+ 582
 □□□
```

```
 □□
  495
+ 228
 □□□
```

```
 □□
  288
+  93
 □□□
```

```
  245
+ 124
 □□□
```

```
  286
+ 147
 □□□
```

```
  364
+  18
 □□□
```

```
  516
+ 203
 □□□
```

```
  343
+ 472
 □□□
```

```
  463
+ 257
 □□□
```

```
  181
+ 192
 □□□
```

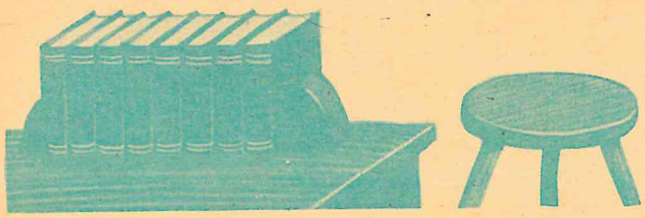
```
  229
+ 112
 □□□
```

```
 $8.14
+  .75
 $□.□□
```

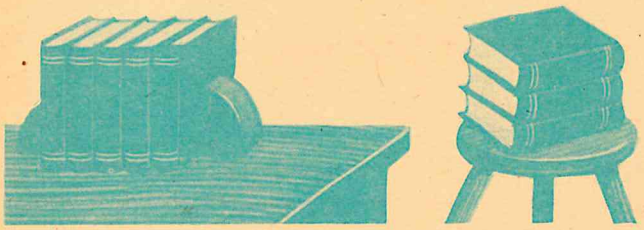
```
 $4.19
+ 2.35
 $□.□□
```

When to Subtract

Taking Away



There were 8 books on John's desk. He put 3 of them on the stool. How many were left on the desk?



$8 - 3 = \square$

How Much More?

Mary is putting 12 candles on her birthday cake. She has already put on 6 candles. How many more must she put on? 6 and how many more equal 12?

$12 - 6 = \square$

Tom needs 95¢ to buy a book. He has saved 45¢. How much more money does he need?

$$\begin{array}{r} 95\ ¢ \\ -\ 45\ ¢ \\ \hline \square\ ¢ \end{array}$$

There were 32 children in a class. 17 of them went home for lunch. The rest ate lunch in school. How many ate lunch in school?

$$\begin{array}{r} 32 \\ -\ 17 \\ \hline \square \end{array}$$

The Difference

Fred earned 85¢ cutting grass. Tom earned 75¢ running errands. What is the difference between their earnings?

$85¢ - 75¢ = \square\ ¢$

Fred saved 42¢. Then he spent 12¢. How much money did he have left?

$$\begin{array}{r} 42\ ¢ \\ -\ 12\ ¢ \\ \hline \square\ ¢ \end{array}$$

Henry is 52 inches tall. Mary is 48 inches tall. What is the difference between their heights?

$$\begin{array}{r} 52 \text{ inches} \\ -\ 48 \text{ inches} \\ \hline \square \text{ inches} \end{array}$$

Thinking Out Subtraction

$258 - 5 = 250 + (8 - 5)$

$= 250 + \quad 3 \quad = \square$

$467 - 2 = 460 + (7 - 2)$

$= 460 + \square = \square$

$869 - 7 = 860 + (9 - 7)$

$= 860 + \square = \square$

$485 - 3 = \square$ $\quad 779 - 8 = \square$

$451 - 1 = \square$ $\quad 625 - 4 = \square$

$806 - 3 = \square$ $\quad 458 - 4 = \square$

$387 - 2 = \square$ $\quad 709 - 6 = \square$

$895 - 20 = 800 + (90 - 20) + 5$

$= 800 + \quad 70 \quad + \quad 5 = \square$

$683 - 40 = 600 + (80 - 40) + 3$

$= 600 + \square + \quad 3 = \square$

$569 - 10 = 500 + (60 - 10) + 9$

$= 500 + \square + \quad 9 = \square$

$887 - 50 = \square$ $\quad 321 - 20 = \square$

$274 - 60 = \square$ $\quad 386 - 30 = \square$

$452 - 50 = \square$ $\quad 691 - 80 = \square$

$555 - 10 = \square$ $\quad 785 - 70 = \square$

$746 - 300 = (700 - 300) + 46 = \square$

$860 - 200 = (800 - 200) + 60 = \square$

$791 - 500 = (700 - 500) + 91 = \square$

$612 - 300 = \square$ $\quad 527 - 100 = \square$

$411 - 100 = \square$ $\quad 509 - 200 = \square$

$813 - 400 = \square$ $\quad 862 - 600 = \square$

$305 - 300 = \square$ $\quad 510 - 500 = \square$

$892 - 431$

$= 892 - 400 - 30 - 1$

$= 492 - 30 - 1$

$= 462 - 1 = \square$

$758 - 244$

$= 758 - 200 - 40 - 4$

$= \square - 40 - 4$

$= \square - 4 = \square$

$463 - 251$

$= 463 - 200 - 50 - 1$

$= \square - 50 - 1$

$= \square - 1 = \square$

$582 - 281$

$= 582 - 200 - 80 - 1$

$= \square - 80 - 1$

$= \square - 1 = \square$

$865 - 365$

$= 865 - 300 - 60 - 5$

$= \square - 60 - 5$

$= \square - 5 = \square$

$324 - 119$

$= 324 - 100 - 10 - 9$

$= \square - 10 - 9$

$= \square - 9 = \square$

$461 - 425$

$= 461 - 400 - 20 - 5$

$= \square - 20 - 5$

$= \square - 5 = \square$

Subtracting Numbers Written as Three-Digit Numerals

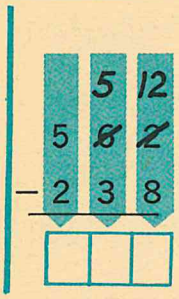
Examples

$$\begin{array}{r} 865 \\ -\ 123 \\ \hline 2 \end{array}$$ Subtract the ones. $5 - 3 = 2$

$$\begin{array}{r} 865 \\ -\ 123 \\ \hline 42 \end{array}$$ Subtract the tens. $6 - 2 = 4$

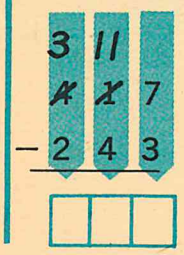
$$\begin{array}{r} 865 \\ -\ 123 \\ \hline 742 \end{array}$$ Subtract the hundreds. $8 - 1 = 7$

$$\begin{array}{r} 5\ 12 \\ 5\ \not{6}\ \not{2} \\ -\ 2\ 3\ 8 \end{array}$$ You cannot take away 8 from 2. Exchange 1 ten for 10 ones. 6 tens + 2 ones = 5 tens + 12 ones.



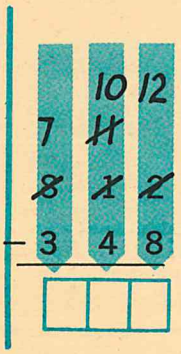
Subtract the ones, tens, and hundreds separately.

$$\begin{array}{r} 3\ 11 \\ \not{4}\ \not{1}\ 7 \\ -\ 2\ 4\ 3 \end{array}$$ You cannot take away 4 from 1. Exchange 1 hundred for 10 tens. 4 hundreds + 1 ten = 3 hundreds + 11 tens.



Subtract the ones, tens, and hundreds separately.

$$\begin{array}{r} 10\ 12 \\ 7\ \not{1}\not{1} \\ \not{8}\ \not{1}\ \not{2} \\ -\ 3\ 4\ 8 \end{array}$$ You cannot take away 8 from 2, or 4 from 1. Exchange 1 hundred for 10 tens. Then exchange 1 ten for 10 ones.



Subtract the ones, tens, and hundreds separately.

$$\begin{array}{r} 518 \\ -\ 207 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} \square\square \\ 481 \\ -\ 135 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} \square\square \\ 509 \\ -\ 235 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} 987 \\ -\ 432 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} \square\square \\ 615 \\ -\ 451 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} \square\square \\ \square\square \\ 711 \\ -\ 456 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} \square\square \\ \square\square \\ 408 \\ -\ 119 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} \square\square \\ 495 \\ -\ 217 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} 803 \\ -\ 503 \\ \hline \square\square\square \end{array}$$

$$\begin{array}{r} \square\square \\ \square\square \\ 424 \\ -\ 185 \\ \hline \square\square\square \end{array}$$

The Nearest Hundred

50 is halfway between 0 and 100.

150 is halfway between 100 and 200.

250 is halfway between ☐ and ☐

350 is halfway between ☐ and ☐

412 is less than 450.

So 412 is nearer to 400 than to 500.

We say 412 is about 400.

678 is more than 650.

So 678 is nearer to 700 than to 600.

We say 678 is about 700.

Circle the right answer.

235 is about	200	300.
380 is about	300	400.
491 is about	400	500.
85 is about	0	100.

Estimating Answers

678 − 412 is about ·

700 − 400 = ☐

385 − 120 is about

400 − 100 = ☐

576 − 285 is about

☐ − ☐ = ☐

285 − 75 is about

☐ − ☐ = ☐

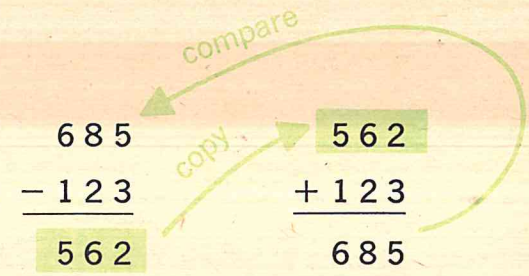
802 − 615 is about

☐ − ☐ = ☐

590 − 210 is about

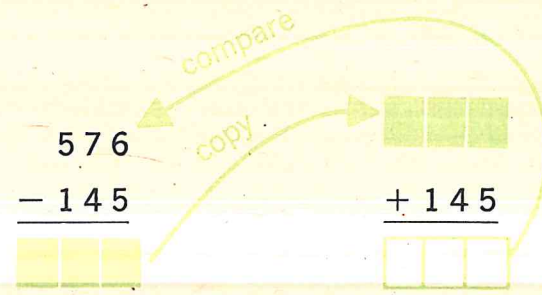
☐ − ☐ = ☐

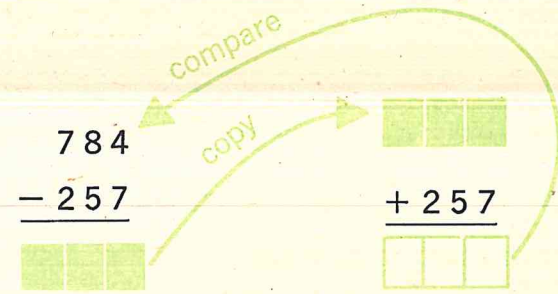
Checking Subtraction

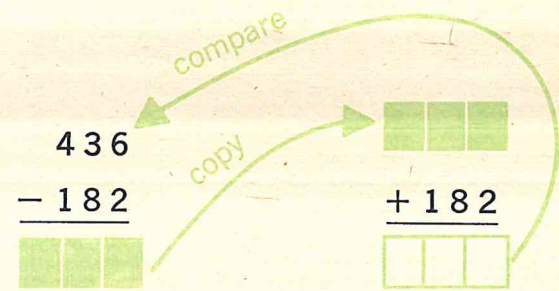


Add the answer to the subtrahend. If the sum equals the minuend, the answer is right.

Subtract and check.







618

− 242

☐☐☐

Multiplication

Mary saved 15¢ a week for 4 weeks. Find her total savings.

First Way

15¢
15¢
15¢
+ 15¢
□ ¢

Second Way

15¢
× 4
□ ¢

When the same number is added many times, it is shorter to multiply. The number that is added many times is the **multiplicand.** The number of times it is used is the **multiplier.** The answer, when you multiply, is called the **product.**

18
18
18
18
+ 18

Instead of adding these 18's, we can multiply □ × 18.

The multiplicand is □.

The multiplier is □.

The product is □.

Change into a multiplication exercise, and find the product.

35
35
+ 35

$3 \times 10 = 30$

$3 \times 20 = 2 \times 30 = \square$

$3 \times 30 = 3 \times 30 = \square$

$3 \times 40 = 4 \times 30 = \square$

$5 \times 10 = 50$

$5 \times 20 = 2 \times 50 = \square$

$5 \times 30 = \square \times 50 = \square$

$5 \times 40 = \square \times 50 = \square$

$6 \times 100 = 600$

$6 \times 200 = 2 \times 600 = \square$

$6 \times 300 = 3 \times 600 = \square$

$6 \times 400 = \square \times 600 = \square$

$8 \times 100 = \square$

$8 \times 200 = 2 \times \square = \square$

$8 \times 300 = 3 \times \square = \square$

$8 \times 400 = \square \times \square = \square$

Thinking Out Multiplication

$4 \times 35 = (4 \times 30) + (4 \times 5)$

$= \square + \square = \square$

$5 \times 62 = (5 \times 60) + (5 \times 2)$

$= \square + \square = \square$

$4 \times 122 = (4 \times 100) + (4 \times 20) + (4 \times 2)$

$= \square + \square + \square = \square$

$3 \times 215 = (3 \times 200) + (3 \times 10) + (3 \times 5)$

$= \square + \square + \square = \square$

$2 \times 156 = 2 \times \square + 2 \times \square + 2 \times \square$

$= \square + \square + \square = \square$

A One-Digit Multiplier and a Three-Digit Multiplicand

Multiply 3×122.

Estimate: about $3 \times 100 =$ ☐

First Way

$$\begin{array}{r} 122 \\ \times\ \ 3 \\ \hline \end{array}$$

$3 \times 2 =$ 6

$3 \times 20 =$ 60

$3 \times 100 =$ 300

☐☐☐

3×2 ones $= 6$ ones

3×2 tens $= 6$ tens

3×1 hundred $= 3$ hundreds

Short Way

$$\begin{array}{r} 122 \\ \times\ \ 3 \\ \hline 366 \end{array}$$

Check

$$\begin{array}{r} 122 \\ 122 \\ +\ 122 \\ \hline \square\square\square \end{array}$$

Multiply 3×145.

Estimate: about $3 \times 100 =$ ☐

First Way

$$\begin{array}{r} 145 \\ \times\ \ 3 \\ \hline \end{array}$$

$3 \times 5 =$ 15

$3 \times 40 =$ 120

$3 \times 100 =$ 300

☐☐☐

3×5 ones $= 15$ ones

15 ones $=$ 1 ten $+ 5$ ones

3×4 tens $= 12$ tens

12 tens $+$ 1 ten $= 13$ tens

13 tens $=$ 1 hundred $+ 3$ tens

3×1 hundred $= 3$ hundreds

3 hundreds $+$ 1 hundred $= 4$ hundreds

Short Way

$$\begin{array}{r} 145 \\ \times\ \ 3 \\ \hline 435 \end{array}$$

Check

$$\begin{array}{r} 145 \\ 145 \\ +\ 145 \\ \hline \square\square\square \end{array}$$

Multiply by the first way, and check by addition.

4×212 Estimate: about ☐

$$\begin{array}{r} 212 \\ \times\ \ 4 \\ \hline \end{array}$$

$4 \times 2 =$ ☐

$4 \times 10 =$ ☐☐

$4 \times 200 =$ ☐☐☐

☐☐☐

Check

$$\begin{array}{r} 212 \\ 212 \\ +\ 212 \\ \hline \square\square\square \end{array}$$

3×176 Estimate: about ☐

$$\begin{array}{r} 176 \\ \times\ \ 3 \\ \hline \end{array}$$

$3 \times 6 =$ ☐☐

$3 \times 70 =$ ☐☐☐

$3 \times 100 =$ ☐☐☐

☐☐☐

Check

$$\begin{array}{r} 176 \\ 176 \\ +\ 176 \\ \hline \end{array}$$

2×128 Estimate: about ☐

$$\begin{array}{r} 128 \\ \times\ \ 2 \\ \hline \end{array}$$

$2 \times 8 =$ ☐☐

$2 \times 20 =$ ☐☐

$2 \times 100 =$ ☐☐☐

☐☐☐

Check

4×152 Estimate: about ☐

$$\begin{array}{r} 152 \\ \times\ \ 4 \\ \hline \end{array}$$

$4 \times 2 =$ ☐

$4 \times 50 =$ ☐☐☐

$4 \times 100 =$ ☐☐☐

☐☐☐

Check

A One-Digit Multiplier and a Three-Digit Multiplicand

Multiply by the short way. To check your answer, multiply by the first way shown on page 14.

Multiply 5×168.

Estimate: $5 \times 200 =$ ☐

$$\begin{array}{r} 1\ 6\ 8 \\ \times\ \ 5 \\ \hline \square\square\square \end{array}$$

Check

$5 \times 8 =$ ☐☐

$5 \times 60 =$ ☐☐☐

$5 \times 100 =$ ☐☐☐

$$\begin{array}{r} 1\ 6\ 8 \\ \times\ \ 5 \\ \hline \square\square\square \\ \square\square\square \\ \square\square\square \\ \hline \square\square\square \end{array}$$

Multiply 4×218.

Estimate: $4 \times 200 =$ ☐

$$\begin{array}{r} 2\ 1\ 8 \\ \times\ \ 4 \\ \hline \square\square\square \end{array}$$

Check

$4 \times 8 =$ ☐☐

$4 \times 10 =$ ☐☐

$4 \times 200 =$ ☐☐☐

$$\begin{array}{r} 2\ 1\ 8 \\ \times\ \ 4 \\ \hline \square\square \\ \square\square \\ \square\square\square \\ \hline \square\square\square \end{array}$$

Multiply 3×275.

Estimate: $3 \times 300 =$ ☐

$$\begin{array}{r} 2\ 7\ 5 \\ \times\ \ 3 \\ \hline \square\square\square \end{array}$$

Check

$3 \times 5 =$ ☐☐

$3 \times 70 =$ ☐☐☐

$3 \times 200 =$ ☐☐☐

$$\begin{array}{r} 2\ 7\ 5 \\ \times\ \ 3 \\ \hline \square\square \\ \square\square\square \\ \square\square\square \\ \hline \square\square\square \end{array}$$

Multiply 4×162.

Estimate: $4 \times 200 =$ ☐

$$\begin{array}{r} 1\ 6\ 2 \\ \times\ \ 4 \\ \hline \square\square\square \end{array}$$

Check

$4 \times 2 =$ ☐

$4 \times 60 =$ ☐☐☐

$4 \times 100 =$ ☐☐☐

$$\begin{array}{r} 1\ 6\ 2 \\ \times\ \ 4 \\ \hline \square \\ \square\square\square \\ \square\square\square \\ \hline \square\square\square \end{array}$$

Multiply 5×102.

Estimate: $5 \times 100 =$ ☐

$$\begin{array}{r} 1\ 0\ 2 \\ \times\ \ 5 \\ \hline \square\square\square \end{array}$$

Check

$5 \times 2 =$ ☐☐

$5 \times 00 =$ ☐☐

$5 \times 100 =$ ☐☐☐

$$\begin{array}{r} 1\ 0\ 2 \\ \times\ \ 5 \\ \hline \square\square \\ \square\square \\ \square\square\square \\ \hline \square\square\square \end{array}$$

Multiply $3 \times \$3.34$.

Estimate: $3 \times \$3.00 =$ $\square.\square\square$

$$\begin{array}{r} \$\ 3.3\ 4 \\ \times\ \ 3 \\ \hline \$\ \square\square.\square\square \end{array}$$

Check

$3 \times \$.04 =$ $\square.\square\square$

$3 \times \$.30 =$ $\square.\square\square$

$3 \times \$3.00 =$ $\square\square.\square\square$

$$\begin{array}{r} \$\ 3.3\ 4 \\ \times\ \ 3 \\ \hline \square.\square\square \\ \square.\square\square \\ \square\square.\square\square \\ \hline \square\square.\square\square \end{array}$$

When to Divide

Here are 16 dots in a row. If you draw lines to divide them into groups of 3, the drawing looks like this:

There are 5 groups of 3, and 1 dot is left. Write:

5 and 1 left

3 ⟌ 16

When a number of things are divided into equal groups, divide by the number of things in each group to find out the number of groups.

A 21-inch length of ribbon was divided into 4-inch strips. How many strips were there?

☐ strips and ☐ inch left

4 ⟌ 21

John has 23 cents. How many 5-cent cakes can he buy?

☐ cakes and ☐ ¢ left

5 ⟌ 23

How many weeks are there in 30 days?

☐ weeks and ☐ days left

7 ⟌ 30

Here are 4 boys and 9 marbles. The boys want to share the marbles equally. Give a marble to a boy by drawing a line from the marble to the boy. Give one marble to each boy. Then give another marble to each boy. Continue until less than four marbles are left. Each boy gets 2 marbles, and 1 marble is left. Write:

2 and 1 left

4 ⟌ 9

When a number of things are divided into equal groups, divide by the number of groups to find out how many things are in each group.

☐ and ☐ left

8 ⟌ 37

☐ and ☐ left

7 ⟌ 65

A One-Digit Divisor and a Two-Digit Dividend

How many boxes of 3 can be filled with 48 tomatoes?

Step I (Trying tens)

$10 \times 3 = 30$

$20 \times 3 = 60$ (too much)

Step II (Estimate)

More than 10 boxes.

Step III

$$\begin{array}{r} 10 \\ 3 \overline{)\,48} \\ 10 \times 3 = \underline{\;30} \\ 48 - 30 = \quad 18 \end{array}$$

Step IV

$$\begin{array}{r} 6 \\ 10 \\ 3 \overline{)\,48} \\ \underline{30} \\ 18 \\ 6 \times 3 = \underline{\;18} \\ 18 - 18 = \quad 0 \end{array}$$

Step V $10 + 6 = 16$

48 tomatoes will fill 16 boxes.

Check $16 \times 3 = 3 \times 16$

$$\begin{array}{r} 16 \\ \times\ 3 \end{array}$$

→ Compare with the dividend

How many 5¢ apples will 65¢ buy?

$10 \times 5 =$ ☐ $20 \times 5 =$ ☐

☐☐ = estimate

$5 \overline{)\,65}$

☐☐ = estimate × 5

65 − ☐☐ = ☐☐

☐☐ = ☐ fives

☐☐ + ☐ = ☐☐

Four boys share 93 cents. How many cents does each boy get?

$4 \times 10 =$ ☐ $4 \times 20 =$ ☐

$4 \times 30 =$ ☐

☐☐ = estimate

$4 \overline{)\,93}$

☐☐ = 4 × estimate

93 − ☐☐ = ☐☐

☐☐ = 4 × ☐

☐

Each boy gets ☐☐ ¢, and ☐ ¢ is left.

How many 4's are there in 84?

$10 \times 4 = 40$ $20 \times 4 = 80$

$30 \times 4 = 120$ (too much)

20 = estimate

$4 \overline{)\,84}$

☐☐ = estimate × 4

84 − ☐☐ = ☐☐

☐ = ☐ fours

☐

20 + ☐ = ☐☐ Answer

How many weeks are there in 82 days?

$10 \times 7 =$ ☐ $20 \times 7 =$ ☐

☐☐ = estimate

$7 \overline{)\,82}$

☐☐ = estimate × 7

82 − ☐☐ = ☐☐

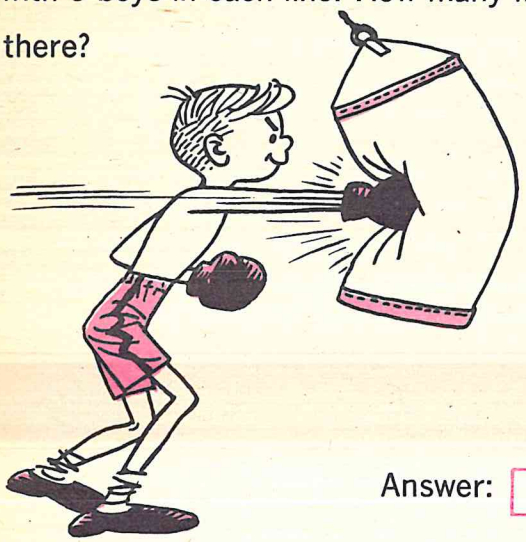
☐☐ = ☐ sevens

☐

There are ☐☐ weeks, and ☐ days left.

Problems

85 boys were arranged in lines in the gym, with 5 boys in each line. How many lines were there?



Answer: ☐

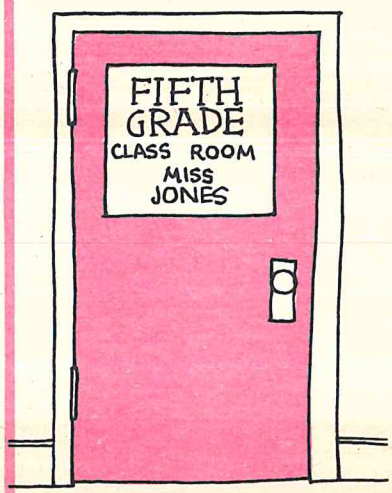
If John saves 5¢ a week, how many weeks will it take him to save 95¢?

Answer: ☐

3 boys had to carry 69 books to the book room. If they divided the books equally, how many did each carry?

Answer: ☐

There were 96 children in the fifth grade. They were divided into 3 equal classes. How many children were in each class?



Answer: ☐

Divide.

$10 \times 8 =$ ☐

$20 \times 8 =$ ☐

$8 \overline{)97}$ ☐☐

Divide.

$10 \times 2 =$ ☐

$20 \times 2 =$ ☐

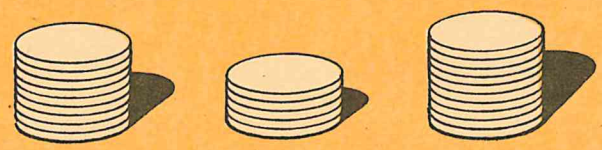
$30 \times 2 =$ ☐

$40 \times 2 =$ ☐

$50 \times 2 =$ ☐

$2 \overline{)94}$ ☐☐

Finding the Average



9¢ 5¢ 10¢

Here are three piles of pennies. They are not equal. How many pennies would there be in each pile if we made them equal?

9¢ + 5¢ + 10¢ = 24¢

24 ÷ 3 = 8¢. There would be 8¢ in each pile.

8¢ is called the **average** of the number of pennies in the 3 piles. We found the average in two steps.

Step I Add the number of pennies in the piles.

Step II Divide by the number of piles.

To find the average of a group of numbers, first add the numbers;
then divide by the number of numbers you added.

A class had this attendance record one week:

Monday	18 present
Tuesday	15 present
Wednesday	17 present
Thursday	19 present
Friday	21 present
Total	☐

To find the average daily attendance for that week, divide by ☐

☐ ⟌ ☐

John took 4 tests. His scores were 6, 8, 10, and 8. If he had four equal scores with the same total, what would each score be?

Step I Find his total score.

Step II Divide by 4.

6 + 8 + 10 + 8 = ☐

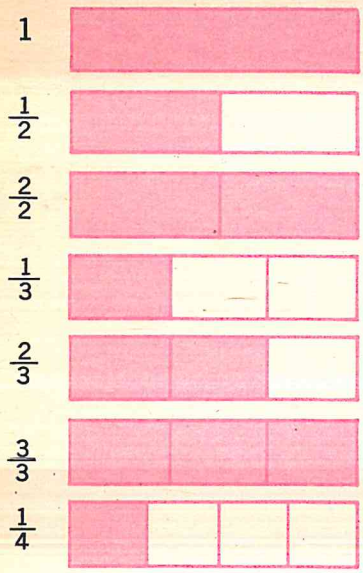
☐ ÷ 4 = ☐

The result is called his **average** score.

John saved 65¢ in 5 weeks. What is the average amount he saved each week? (Here you do not have to find the total because you know it is 65¢.)

☐ ⟌ 65

Meaning of Fractions



1 whole

Divide a whole into 2 equal parts. → $\frac{1}{2}$ ← Take 1 part.

Divide a whole into 2 equal parts. → $\frac{2}{2}$ ← Take 2 parts.

Divide a whole into ☐ equal parts. → $\frac{1}{3}$ ← Take ☐ part.

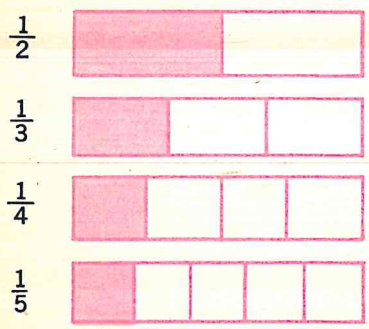
Divide a whole into ☐ equal parts. → $\frac{2}{3}$ ← Take ☐ parts.

Divide a whole into ☐ equal parts. → $\frac{3}{3}$ ← Take ☐ parts.

Divide a whole into ☐ equal parts. → $\frac{1}{4}$ ← Take ☐ part.

The number under the fraction line is the **denominator.** It tells you the number of equal parts into which a whole is divided.

The number over the fraction line is the **numerator.** It tells you how many of these equal parts to take.



Compare the parts shown in this diagram.

Circle the right answer.

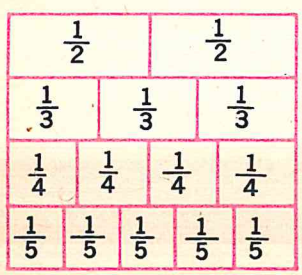
$\frac{1}{3}$ is (larger smaller) than $\frac{1}{2}$.

$\frac{1}{4}$ is (larger smaller) than $\frac{1}{3}$.

$\frac{1}{5}$ is (larger smaller) than $\frac{1}{4}$.

The more equal parts there are in a whole, the (smaller larger) each part is.

If the numerator of a fraction is 1, the larger the denominator is, the (smaller larger) the fraction is.



Rewrite each set of fractions in order of size, with the smallest fraction first.

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{3}$ _____

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ _____

$\frac{1}{2}$ $\frac{2}{5}$ $\frac{2}{3}$ _____

$\frac{4}{5}$ $\frac{3}{4}$ $\frac{2}{3}$ _____

Comparison of Fractions

1 whole

In the drawing below, enough fourths are colored to make one half.

$\frac{1}{2}$	$\frac{1}{2}$

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

You need 2 fourths to make 1 half. A half is twice as big as a fourth. A fourth is half as big as a half.

Color enough eighths to make one fourth.

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

You need ☐ eighths to make 1 fourth.

A fourth is _____ as big as an eighth.

An eighth is _____ as big as a fourth.

Color enough sixths to make one third.

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

You need ☐ sixths to make 1 third.

A third is _____ as big as a sixth.

A sixth is _____ as big as a third.

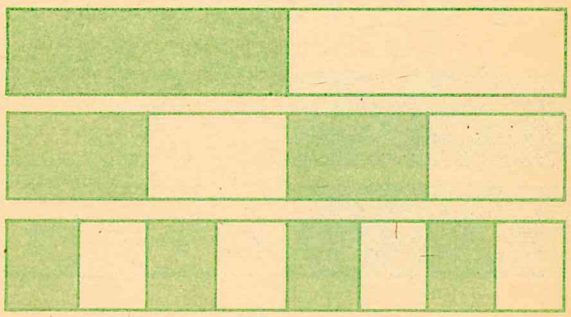
Circle the larger of each pair of numbers.

$\frac{1}{2}$ 1	$\frac{1}{3}$ $\frac{1}{2}$
$\frac{1}{3}$ $\frac{1}{4}$	1 $\frac{2}{3}$
$\frac{1}{4}$ $\frac{1}{5}$	$\frac{3}{4}$ $\frac{1}{2}$
$\frac{2}{3}$ $\frac{1}{2}$	1 $\frac{3}{4}$

Circle the largest fraction.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{3}{4}$ $\frac{2}{3}$

Compare halves, fourths, and eighths.

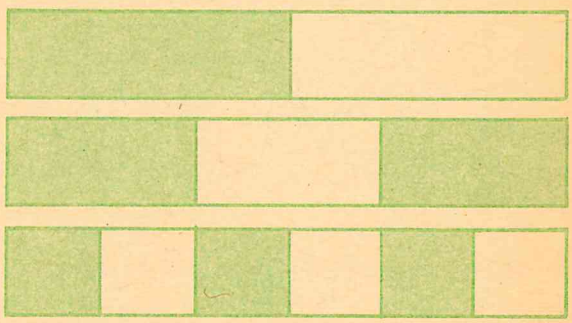


1 half = ☐ fourths = ☐ eighths

$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{8}$

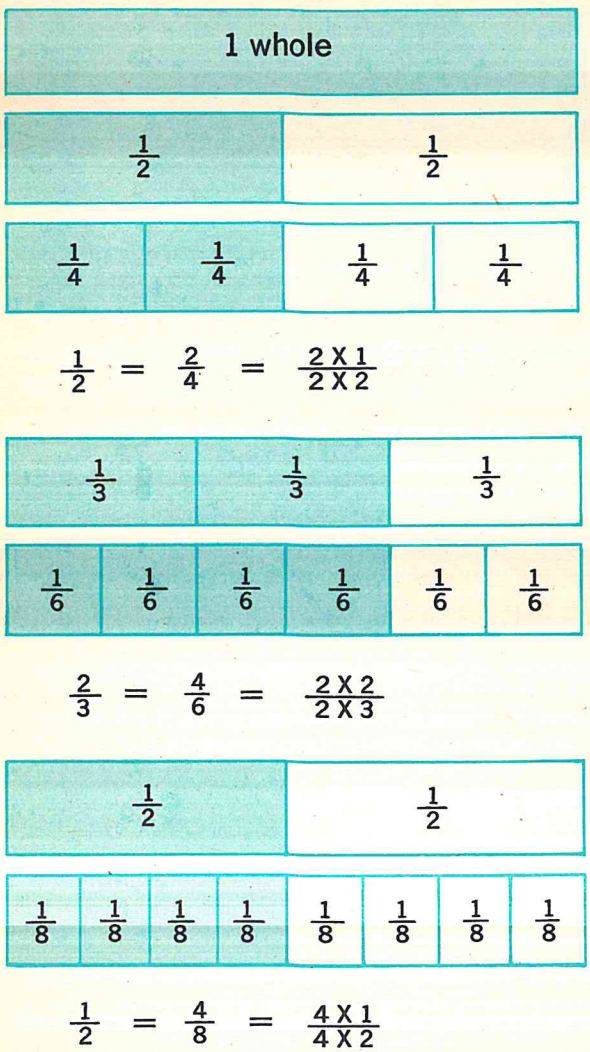
$\frac{1}{4} = \frac{\square}{8}$ $\frac{3}{4} = \frac{\square}{8}$

Compare halves, thirds, and sixths.



$\frac{1}{2} = \frac{\square}{6}$ $\frac{2}{3} = \frac{\square}{6}$ $\frac{1}{3} = \frac{\square}{6}$

Changing to Higher Terms



$\frac{1}{2} = \frac{2}{4} = \frac{2 \times 1}{2 \times 2}$

$\frac{2}{3} = \frac{4}{6} = \frac{2 \times 2}{2 \times 3}$

$\frac{1}{2} = \frac{4}{8} = \frac{4 \times 1}{4 \times 2}$

Changing to an equal fraction with a higher denominator is called changing to higher terms. **To change to higher terms, multiply both numerator and denominator by the same number.**

Write the missing numbers to change to higher terms.

$\frac{1}{3} = \frac{\square}{2 \times 3} = \frac{\square}{\square}$

$\frac{1}{5} = \frac{\square}{3 \times 5} = \frac{\square}{\square}$

$\frac{2}{3} = \frac{\square}{3 \times 3} = \frac{\square}{\square}$

Write the missing numbers.

$\frac{1}{2} = \frac{\square}{\square} \times \frac{1}{2} = \frac{\square}{6}$

$\frac{1}{2} = \frac{\square}{\square} \times \frac{1}{2} = \frac{\square}{4}$

$\frac{1}{2} = \frac{\square}{\square} \times \frac{1}{2} = \frac{\square}{10}$

$\frac{1}{3} = \frac{\square}{\square} \times \frac{1}{3} = \frac{\square}{6}$

$\frac{1}{3} = \frac{\square}{\square} \times \frac{1}{3} = \frac{\square}{9}$

$\frac{1}{3} = \frac{\square}{\square} \times \frac{1}{3} = \frac{\square}{12}$

$\frac{1}{4} = \frac{\square}{\square} \times \frac{1}{4} = \frac{\square}{12}$

$\frac{1}{4} = \frac{\square}{\square} \times \frac{1}{4} = \frac{\square}{8}$

$\frac{1}{5} = \frac{\square}{\square} \times \frac{1}{5} = \frac{\square}{10}$

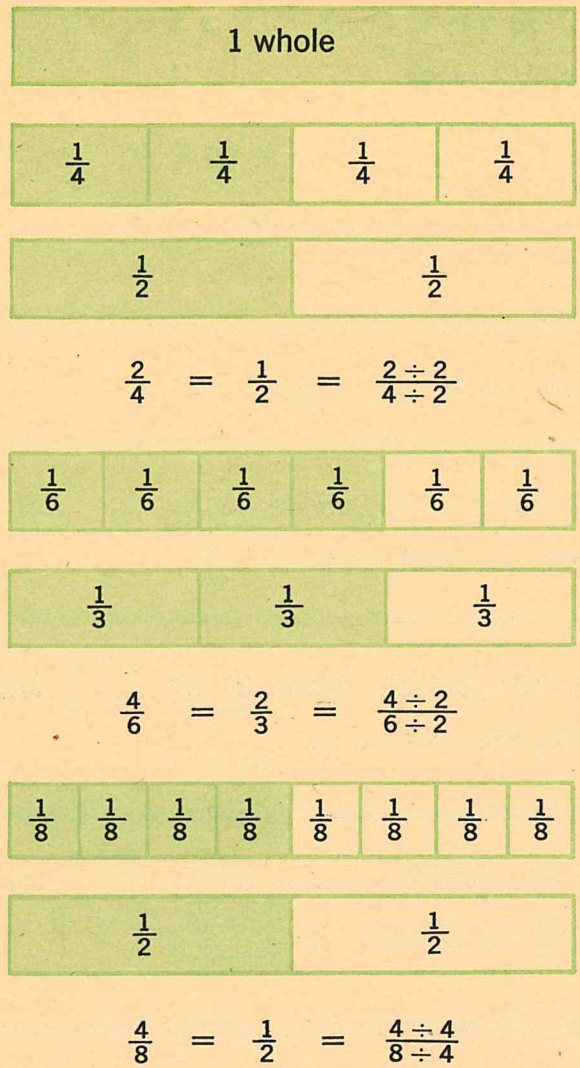
$\frac{1}{5} = \frac{\square}{\square} \times \frac{1}{5} = \frac{\square}{20}$

$\frac{2}{5} = \frac{\square}{\square} \times \frac{2}{5} = \frac{\square}{10}$

$\frac{2}{5} = \frac{\square}{\square} \times \frac{2}{5} = \frac{\square}{15}$

$\frac{3}{5} = \frac{\square}{\square} \times \frac{3}{5} = \frac{\square}{15}$

Changing to Lower Terms



Changing to an equal fraction with a lower denominator is called changing to lower terms.

To change to lower terms, divide both numerator and denominator by the same number.

Write the missing numbers to change to lower terms.

$\frac{6}{8} = \frac{6 \div \square}{8 \div 2} = \frac{\square}{\square}$

$\frac{4}{8} = \frac{4 \div \square}{8 \div 4} = \frac{\square}{\square}$

$\frac{6}{9} = \frac{6 \div \square}{9 \div 3} = \frac{\square}{\square}$

$\frac{3}{12} = \frac{3 \div \square}{12 \div \square} = \frac{\square}{4}$

$\frac{2}{4} = \frac{2 \div \square}{4 \div \square} = \frac{\square}{2}$

$\frac{6}{12} = \frac{6 \div \square}{12 \div \square} = \frac{\square}{2}$

$\frac{4}{10} = \frac{4 \div \square}{10 \div \square} = \frac{\square}{5}$

$\frac{8}{12} = \frac{8 \div \square}{12 \div \square} = \frac{\square}{6}$

$\frac{8}{12} = \frac{8 \div \square}{12 \div \square} = \frac{\square}{3}$

$\frac{6}{9} = \frac{6 \div \square}{9 \div \square} = \frac{\square}{3}$

$\frac{3}{15} = \frac{3 \div \square}{15 \div \square} = \frac{\square}{5}$

$\frac{6}{10} = \frac{\square \div}{\div 2} = \frac{\square}{\square}$

$\frac{9}{12} = \frac{\square \div}{\div 3} = \frac{\square}{\square}$

$\frac{4}{16} = \frac{\square \div}{\div 4} = \frac{\square}{\square}$

$\frac{4}{16} = \frac{\square \div}{\div 2} = \frac{\square}{\square}$

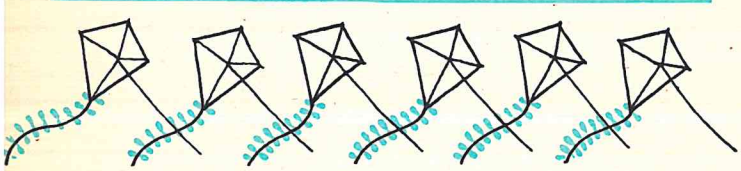
$\frac{8}{16} = \frac{\square \div}{\div 8} = \frac{\square}{\square}$

Fractional Parts of Groups

○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

Color $\frac{1}{3}$ of these 12 checkers. $\frac{1}{3}$ means divide into 3 equal parts and take 1 part.

$12 \div 3 =$ ☐ $\quad \frac{1}{3}$ of $12 =$ ☐



Color $\frac{1}{2}$ of these kites. $\frac{1}{2}$ means divide into ☐ equal parts and take 1 part.

$6 \div$ ☐ $=$ ☐ $\quad \frac{1}{2}$ of $6 =$ ☐

Choose the correct divisor to help you find these fractional parts.

$12 \div$ ☐ $=$ ☐ $\quad \frac{1}{3}$ of $12 =$ ☐

$12 \div$ ☐ $=$ ☐ $\quad \frac{1}{4}$ of $12 =$ ☐

$20 \div$ ☐ $=$ ☐ $\quad \frac{1}{4}$ of $20 =$ ☐

$24 \div$ ☐ $=$ ☐ $\quad \frac{1}{8}$ of $24 =$ ☐

$45 \div$ ☐ $=$ ☐ $\quad \frac{1}{9}$ of $45 =$ ☐

$63 \div$ ☐ $=$ ☐ $\quad \frac{1}{7}$ of $63 =$ ☐

$50 \div$ ☐ $=$ ☐ $\quad \frac{1}{5}$ of $50 =$ ☐

$48 \div$ ☐ $=$ ☐ $\quad \frac{1}{6}$ of $48 =$ ☐

$30 \div$ ☐ $=$ ☐ $\quad \frac{1}{6}$ of $30 =$ ☐

$\frac{2}{3}$ of 30 means divide 30 into 3 equal parts and take 2 parts.

$30 \div 3 = 10 \qquad 2 \times 10 = 20$

$\frac{2}{3}$ of $30 = 20$

Write the missing numbers.

To find $\frac{3}{5}$ of 40, divide 40 by ☐ and multiply the quotient by ☐

To find $\frac{2}{3}$ of 21, divide 21 by ☐ and multiply the quotient by ☐

To find $\frac{3}{8}$ of 64, divide 64 by ☐ and multiply the quotient by ☐

$\frac{3}{7}$ of $35 = 3 \times (\frac{1}{7}$ of $35)$

$= 3 \times$ ☐ $=$ ☐

$\frac{2}{9}$ of $54 = 2 \times (\frac{1}{9}$ of $54)$

$= 2 \times$ ☐ $=$ ☐

$\frac{3}{8}$ of $32 =$ ☐ $\times (\frac{1}{8}$ of $32)$

$=$ ☐ $\times$ ☐ $=$ ☐

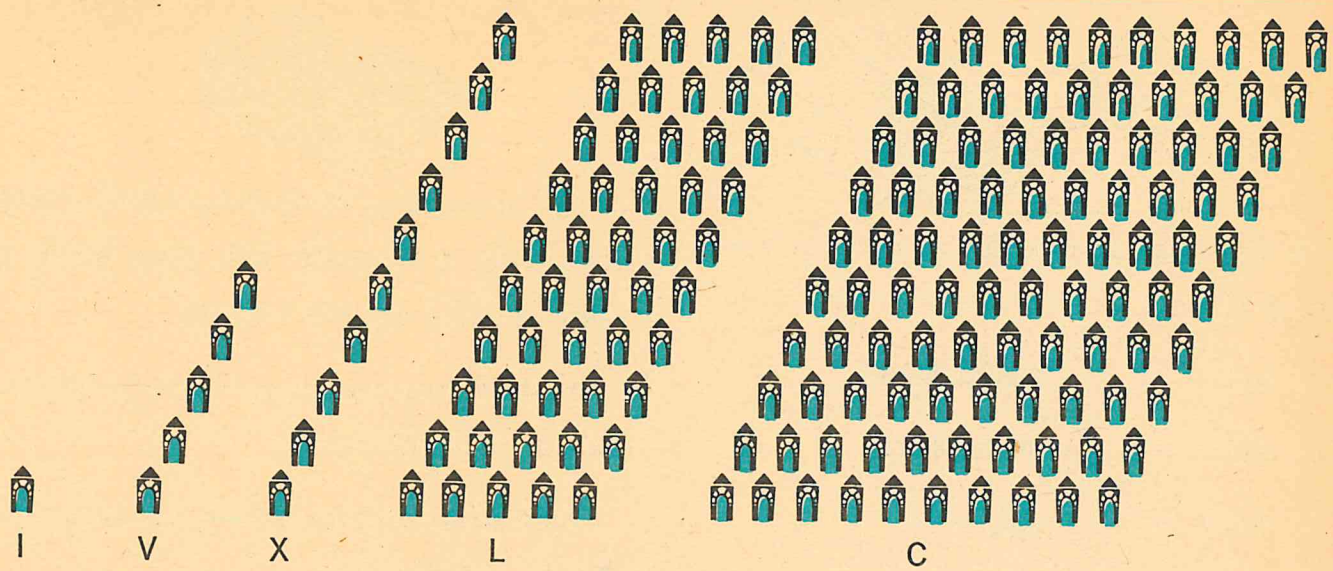
$\frac{3}{5}$ of $45 =$ ☐ $\times (\frac{1}{\square}$ of $45)$

$=$ ☐ $\times$ ☐ $=$ ☐

$\frac{3}{6}$ of $36 =$ ☐ $\times (\frac{1}{\square}$ of $36)$

$=$ ☐ $\times$ ☐ $=$ ☐

Roman Numerals Up to One Hundred



I means 1.

V means 5.

X means 10.

L means 50.

C means 100.

XL = 50 − 10 = ☐

LX = 50 + 10 = ☐

XC = 100 − 10 = ☐

CX = 100 + 10 = ☐

In Roman numerals, when the same numeral is repeated, it means add:

II = 1 + 1 = ☐ XX = 10 + 10 = ☐

When a smaller number is written after a larger number, it means add:

VI = 5 + 1 = ☐ XI = 10 + 1 = ☐

When a smaller number is written before a larger number, it means subtract:

IV = 5 − 1 = ☐ IX = 10 − 1 = ☐

XLV = 40 + ☐ = ☐

XLVII = 40 + ☐ = ☐

XLIX = 40 + ☐ = ☐

LIV = 50 + ☐ = ☐

LVIII = 50 + ☐ = ☐

LIX = 50 + ☐ = ☐

LX = 50 + ☐ = ☐

LXX = 50 + ☐ = ☐

LXXX = 50 + ☐ = ☐

XC = ☐ − 10 = ☐

LXII = 50 + 10 + ☐ = ☐

LXXV = 50 + 20 + ☐ = ☐

LXXXIV = 50 + ☐ + 4 = ☐

XCVI = 90 + ☐ + ☐ = ☐

LXIII = ☐

LVII = ☐

LXIX = ☐

LXXIV = ☐

LXXV = ☐

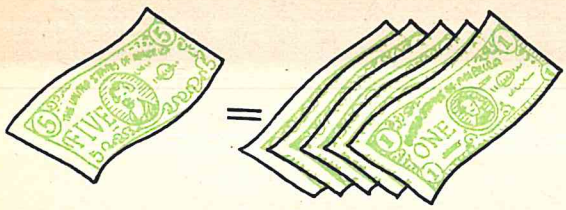
LXXVI = ☐

LXXXVIII = ☐

LXXXIX = ☐

XC = ☐

Change of Five Dollars



A five-dollar bill is worth as much as 5 one-dollar bills.

1 dollar = ☐ half-dollars

5 dollars = ☐ half-dollars

1 dollar = ☐ quarters

5 dollars = ☐ quarters

1 dollar = ☐ dimes

5 dollars = ☐ dimes

1 dollar = ☐ nickels

5 dollars = ☐ nickels

1 dollar = ☐ pennies

5 dollars = ☐ pennies

A five-dollar bill is worth 3 one-dollar bills + ☐ quarters; or 2 one-dollar bills + ☐ quarters; or 4 one-dollar bills + ☐ dimes.

Count by pennies.

$3.96 $3.97 ☐ ☐ ☐

Count by nickels.

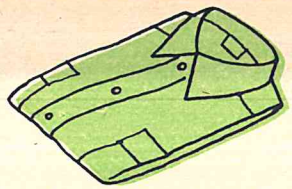
$2.05 $2.10 ☐ ☐ ☐

Count by dimes.

$4.10 $4.20 ☐ ☐ ☐

Count by quarters.

$1.50 $1.75 ☐ ☐ ☐



Mr. Jones bought a shirt for $2.67. He paid for it with a five-dollar bill. Here is how the clerk counted out the change:

First he counted by pennies from $2.67 to $2.70. (3 pennies)

Then he counted by nickels until he reached $2.75. (1 nickel)

Then he counted by quarters until he reached $3.00. (1 quarter)

Then he counted by dollars until he reached $5.00. (2 dollars)

So he gave 3 pennies, 1 nickel, 1 quarter, and 2 dollars for change. The change was worth $ ☐ . ☐☐ .

A man made a purchase for $1.36. He paid for it with a five-dollar bill. To make change, the clerk first counted by pennies from $1.36 to $1.40: ☐ pennies.

Then he counted by nickels until he reached $1.50: ☐ nickels.

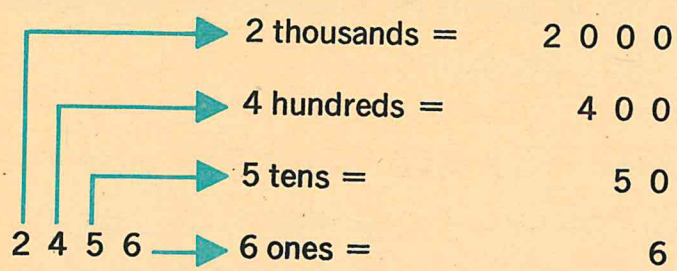
Then he counted by quarters until he reached $2.00: ☐ quarters.

Then he counted by dollars until he reached $5.00: ☐ dollars.

He gave ☐ pennies, ☐ nickels, ☐ quarters, and ☐ dollars for change. The change was worth $ ☐ . ☐☐ .

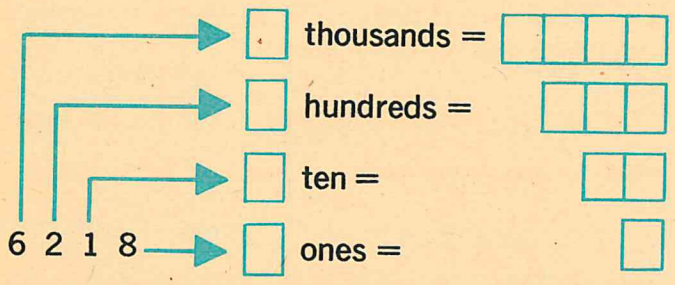
Four-Digit Numerals

In a four-digit numeral, the fourth digit from the right shows the number of thousands.



In words: two thousand four hundred fifty-six.

Show the meaning of this numeral, and write it in words:



In words: _____

_____

---

1 thousand = 10 hundreds

2 thousands = ☐ hundreds

3 thousands = ☐ hundreds

4 thousands = ☐ hundreds

50 hundreds = 5 thousands

60 hundreds = ☐ thousands

70 hundreds = ☐ thousands

80 hundreds = ☐ thousands

90 hundreds = ☐ thousands

Half of one thousand = ☐ hundreds

= ☐☐☐

Count by thousands.

1000 ☐ ☐ ☐

☐ ☐ ☐ ☐

Count by hundreds.

1700 ☐ ☐ ☐

Count by tens.

2980 ☐ ☐ ☐

Count by fives.

4815 ☐ ☐ ☐

Count by ones.

7998 ☐ ☐ ☐

Write each number in numerals.

six thousand four hundred nineteen: ☐☐☐☐

three thousand two hundred five: ☐☐☐☐

five thousand one: ☐☐☐☐

---

4 thousands + 6 hundreds

= 3 thousands + ☐ hundreds.

8 thousands + 2 hundreds

= ☐ thousands + 12 hundreds.

Round off to the nearest thousand, and circle the right answer:

2800 is about 3000 2000.

4200 is about 4000 5000.

6199 is about 6000 7000.

Adding Numbers Written as Four-Digit Numerals

To add numbers with four digits, first add the ones. Then add the tens, the hundreds, and the thousands, in that order.

You may have to exchange 10 ones for 1 ten, or 10 tens for 1 hundred, or 10 hundreds for 1 thousand.

Examples

$$\begin{array}{r} {\scriptstyle 1} \\ 2406 \\ +\,4128 \\ \hline 4 \end{array}$$ $6 + 8 = 14 =$ (1) ten + 4 ones

$$\begin{array}{r} {\scriptstyle 1} \\ 2406 \\ +\,4128 \\ \hline 34 \end{array}$$ $$\begin{array}{r} {\scriptstyle 1} \\ 2406 \\ +\,4128 \\ \hline 534 \end{array}$$ $$\begin{array}{r} {\scriptstyle 1} \\ 2406 \\ +\,4128 \\ \hline 6534 \end{array}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 5286 \\ +\,1349 \\ \hline 5 \end{array}$$ $6 + 9 = 15 =$ (1) ten + 5 ones

$$\begin{array}{r} {\scriptstyle 11} \\ 5286 \\ +\,1349 \\ \hline 35 \end{array}$$ $(1 + 8 + 4)$ tens $= 13$ tens $=$ (1) hundred + 3 tens

$$\begin{array}{r} {\scriptstyle 11} \\ 5286 \\ +\,1349 \\ \hline \square\square35 \end{array}$$

$$\begin{array}{r} {\scriptstyle \square} \\ 2581 \\ +\,1224 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} {\scriptstyle \square} \\ 4821 \\ +\,2311 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} {\scriptstyle \square} \\ 6008 \\ +\,2009 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} {\scriptstyle \square\square\square} \\ 3875 \\ +\,1629 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} {\scriptstyle \square\square} \\ 5555 \\ +\,2861 \\ \hline \square\square\square\square \end{array}$$

$$\begin{array}{r} 5110 \\ +\,3125 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} 2995 \\ +\,416 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} 8210 \\ +\,93 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} 6000 \\ +\,2105 \\ \hline \square\square\square\square \end{array}$$ $$\begin{array}{r} 1576 \\ +\,2534 \\ \hline \square\square\square\square \end{array}$$

$$\begin{array}{r} \$12.15 \\ +\,14.20 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$19.09 \\ +\,7.89 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$10.05 \\ +\,5.05 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$24.80 \\ +\,15.30 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$14.75 \\ +\,24.75 \\ \hline \$\square\square.\square\square \end{array}$$

$$\begin{array}{r} \$21.05 \\ +\,9.00 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$13.10 \\ +\,15.50 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$81.19 \\ +\,12.19 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$15.80 \\ +\,16.80 \\ \hline \$\square\square.\square\square \end{array}$$ $$\begin{array}{r} \$17.36 \\ +\,72.64 \\ \hline \$\square\square.\square\square \end{array}$$

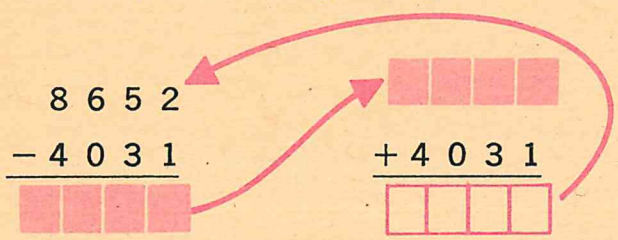
Subtracting Numbers Written as Four-Digit Numerals

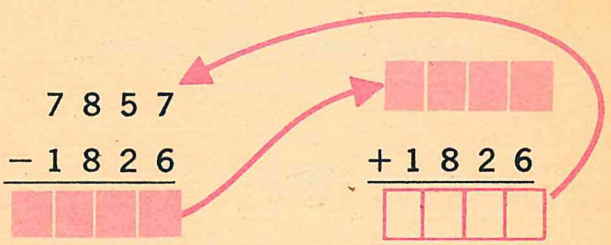
Examples

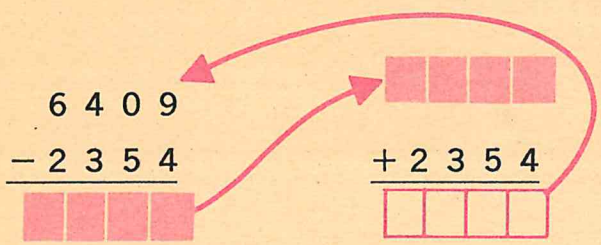
4 7 8 9 − 1 2 3 6 3	4 7 8 9 − 1 2 3 6 5 3	4 7 8 9 − 1 2 3 6 5 5 3	4 7 8 9 − 1 2 3 6 3 5 5 3
Subtract the ones. 9 − 6 = 3	Subtract the tens. 8 − 3 = 5	Subtract the hundreds. 7 − 2 = 5	Subtract the thousands. 4 − 1 = 3

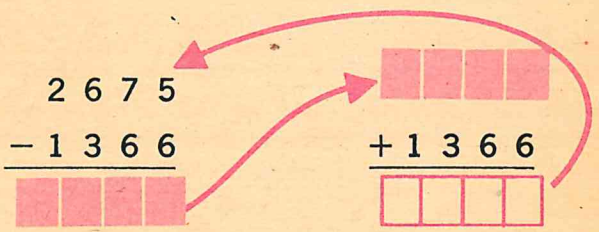
5 2 8 7 − 1 3 4 6 1	5 2 8 7 − 1 3 4 6 4 1	4 12 ~~5~~ ~~2~~ 8 7 − 1 3 4 6 4 1	You cannot take away 3 from 2. Exchange 1 thousand for 10 hundreds. 5 thousand + 2 hundreds = 4 thousands + 12 hundreds.	4 12 ~~5~~ ~~2~~ 8 7 − 1 3 4 6 □□ 4 1

Subtract, and check by adding.





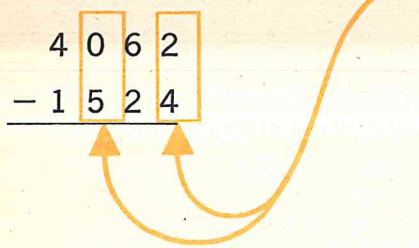




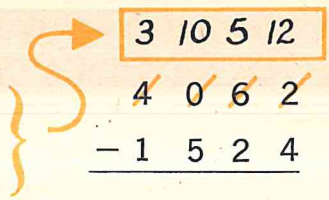
$ 5 2.6 5 − 1 2.4 1 $□□.□□	$□□.□□ + 1 2.4 1 $□□.□□	$ 4 8.0 5 − 1 7.1 2 $□□.□□	$□□.□□ + 1 7.1 2 $□□.□□
$ 6 3.8 5 − 1 9.2 5 $□□.□□	$□□.□□ + 1 9.2 5 $□□.□□	$ 7 1.9 0 − 2 4.8 0 $□□.□□	$□□.□□ + □□.□□ $□□.□□

Subtracting Numbers Written as Four-Digit Numerals

Examples



You cannot take away 4 from 2.
You cannot take away 5 from 0.
Exchange 1 ten for 10 ones.
Exchange 1 thousand for 10 hundreds.
Then subtract.

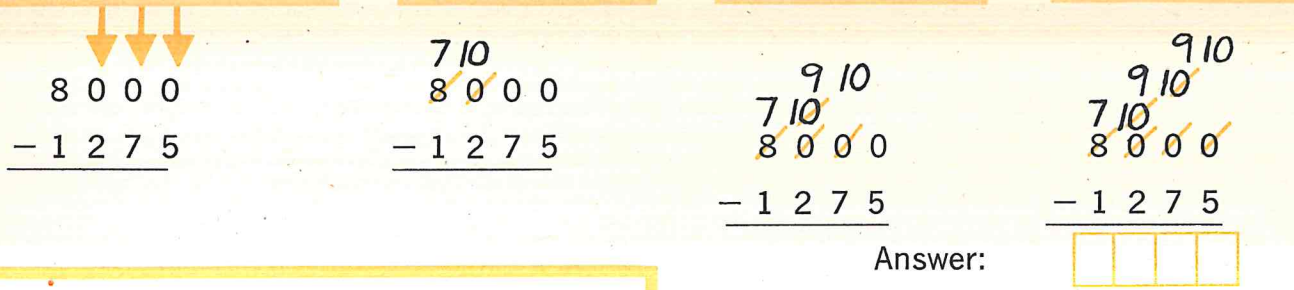


You cannot take away 5 from 0, 7 from 0, or 2 from 0.

First exchange 1 thousand for 10 hundreds.

Then exchange 1 hundred for 10 tens.

Then exchange 1 ten for 10 ones.



Answer: ☐☐☐☐

In the exercises below, make exchanges where you need them. Then subtract.

Check.

6 4 8 2
− 2 1 9 5
☐☐☐☐

Check.

4 3 1 9
− 1 8 5 1
☐☐☐☐

Check.

5 3 3 1
− 1 1 3 7
☐☐☐☐

Check.

6 0 0 0
− 2 5 1 9
☐☐☐☐

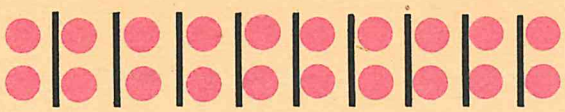
Check.

$ 8 6 . 1 2
− 1 4 . 7 9
$ ☐☐.☐☐

Check.

$ 7 0 . 0 0
− 2 5 . 5 0
$ ☐☐.☐☐

Multiplying by Ten



10 columns of twos = 2 rows of tens

$10 \times 2 = 2 \times 10 = 2$ tens $= 20$

$10 \times 3 = 3 \times 10 = 3$ tens $= 30$

$10 \times 4 = \square \times 10 = \square$ tens $= \square$

$10 \times 5 = \square \times 10 = \square$ tens $= \square$

$10 \times 6 = \square \times 10 = \square$ tens $= \square$

$10 \times 7 = \square \times 10 = \square$ tens $= \square$

$10 \times 8 = \square \times 10 = \square$ tens $= \square$

$10 \times 9 = \square \times 10 = \square$ tens $= \square$

$10 \times 13 = 13 \times 10 = 13$ tens

$= 10$ tens $+ 3$ tens

$= 1$ hundred $+ 3$ tens $= 130$

$10 \times 45 = 45 \times 10 = 45$ tens

$= 40$ tens $+ \square$ tens

$= \square$ hundreds $+ \square$ tens $= \square$

$10 \times$ (Tens: 3, Ones: 3) $=$ (3, 0)

Multiplying 3 by 10 changes 3 ones to 3 tens. The 3 moves one place to the left, and 0 holds the ones place.

$10 \times$ (Hundreds: 2, Tens: 7, Ones: 7) $=$ (2, 7, 0)

Multiplying a number by 10 moves each digit one place to the left, and 0 holds the ones place.

$10 \times$ (Tens: 4, Ones: 4) $=$ (4, 0)

$10 \times$ (Tens: 5, Ones: 5) $=$ (5, 0)

$10 \times$ (Hundreds: 3, Tens: 3, Ones: 6) $=$ (□, □, 0)

$10 \times$ (Hundreds: 7, Tens: 7, Ones: 2) $=$ (□, □, 0)

$10 \times$ (Tens: 7, Ones: 7) $=$ (□, □)

$10 \times$ (Tens: 2, Ones: 2) $=$ (□, □)

$10 \times$ (Hundreds: 4, Tens: 4, Ones: 9) $=$ (□, □, □)

$10 \times$ (Hundreds: 5, Tens: 5, Ones: 4) $=$ (□, □, □)

Multiplying by Multiples of Ten

$20 \times 3 = 2 \times (10 \times 3)$

$= 2 \times 30 = 60$

Multiplying by 20 is like multiplying first by 10, and then by 2.

3
× 2 0
6 0

To multiply by 20, first put down 0, and move left. This is like multiplying by 10.

Then multiply by 2.

$40 \times 7 = 4 \times (10 \times 7)$

$= 4 \times 70 =$ ☐

Multiplying by 40 is like multiplying first by 10 and then by 4.

7
× 4 0
0

Put down 0.

Move left, and multiply by 4.

8
× 5 0

Put down 0.

Move left, and multiply by 5.

9
× 6 0

Put down 0.

Move left, and multiply by 6.

1 8
× 2 0

Put down 0.

Move left, and multiply by ☐

4 2
× 3 0

Put down 0.

Move left, and multiply by ☐

1 5
× 8 0

Put down 0.

Move left, and multiply by ☐

2 3
× 2 0

5 2
× 4 0

1 7
× 3 0

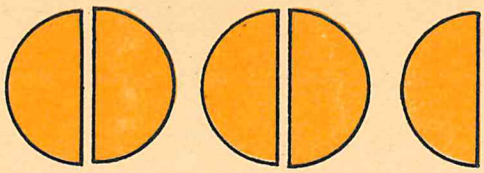
1 1
× 9 0

2 4
× 6 0

1 0
× 5 0

$70 \times 12 =$ ☐☐☐ $40 \times 5 =$ ☐☐☐

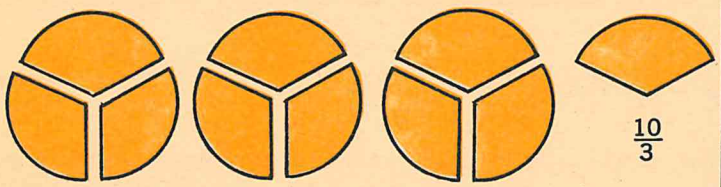
Changing Improper Fractions to Mixed or Whole Numbers



$\frac{5}{2}$

Each group of 2 halves makes 1 whole. Think: Divide 5 by 2. The answer is 2, and 1 left. So there are 2 wholes, and 1 half left.

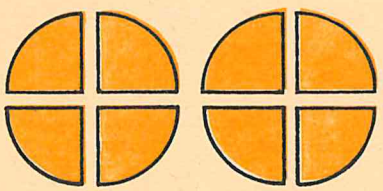
$\frac{5}{2} = 2\ \frac{1}{2}$



$\frac{10}{3}$

Each group of 3 thirds makes 1 whole. Think: Divide 10 by 3. The answer is ☐ and ☐ left. So there are ☐ wholes, and ☐ third left.

$\frac{10}{3} = \square\ \frac{\square}{\square}$



$\frac{8}{4}$

Each group of ☐ fourths makes 1 whole. Think: Divide 8 by ☐. The answer is ☐ and none left. So there are ☐ wholes, and no fourths left.

$\frac{8}{4} = \square$

To change an improper fraction to a mixed or whole number, divide the numerator by the denominator.

$\frac{8}{5} = \square\ \frac{\square}{5}$ $\quad \frac{7}{3} = \square\ \frac{\square}{3}$

$\frac{13}{6} = \square\ \frac{\square}{6}$ $\quad \frac{10}{5} = \square$

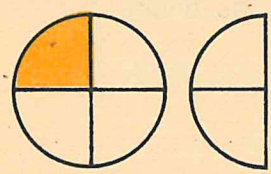
$\frac{10}{4} = \square\ \frac{\square}{\square}$ $\quad \frac{17}{5} = \square\ \frac{\square}{\square}$

$\frac{12}{4} = \square$ $\quad \frac{16}{2} = \square$

$\frac{9}{6} = \square\ \frac{\square}{\square}$ $\quad \frac{14}{7} = \square$

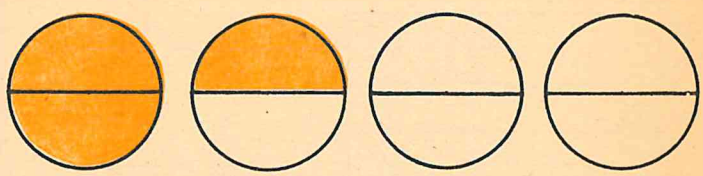
$\frac{8}{8} = \square$ $\quad \frac{8}{4} = \square$

$\frac{15}{6} = \square\ \frac{\square}{\square}$ $\quad \frac{5}{3} = \square\ \frac{\square}{\square}$



Color one more fourth at a time. The number of fourths after each step is:

$\frac{1}{4}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$



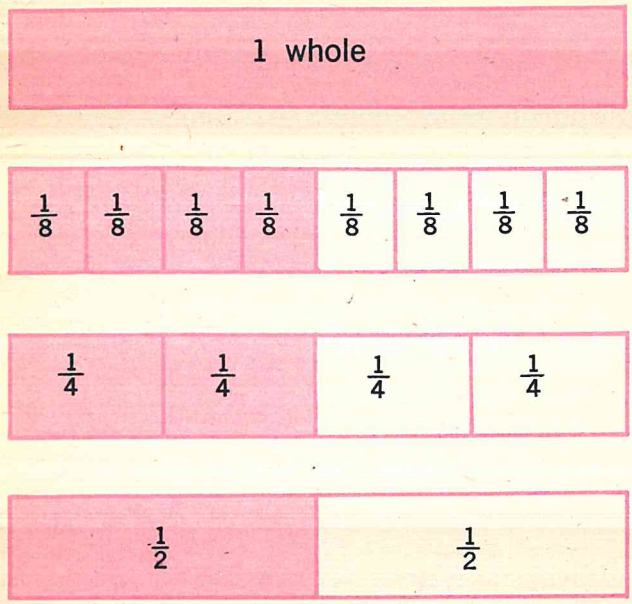
Color one more half at a time. The total amount colored after each step is:

$1\frac{1}{2}$, ☐, $\square\ \frac{\square}{\square}$, ☐, $\square\ \frac{\square}{\square}$, ☐

Count by eighths.

$\frac{1}{8}$, $\frac{\square}{8}$, $\frac{\square}{8}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$, $\frac{\square}{\square}$

Reducing to Lowest Terms



$\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$ ← lowest denominator

Reduce to lowest terms means change to an equal fraction with the lowest denominator.

2 4 6	$\frac{6}{12} = \frac{\square}{\square}$
2 4 6	$\frac{6}{18} = \frac{\square}{\square}$
3 6 9	$\frac{9}{15} = \frac{\square}{\square}$
3 6 9	$\frac{9}{12} = \frac{\square}{\square}$
2 5 10	$\frac{10}{12} = \frac{\square}{\square}$
2 5 10	$\frac{10}{15} = \frac{\square}{\square}$
2 5 10	$\frac{10}{20} = \frac{\square}{\square}$

To change $\frac{8}{12}$ to sixths, divide 8 and 12 by $\square$

To change $\frac{8}{12}$ to thirds, divide 8 and 12 by $\square$

In lowest terms $\frac{8}{12} = \frac{\square}{3}$.

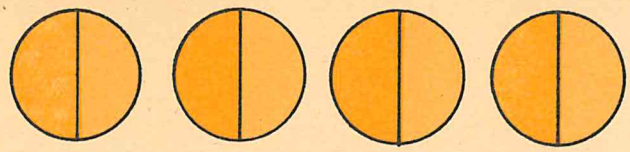
Circle the numbers that divide evenly into both numerator and denominator. Use the largest divisor to reduce to lowest terms.

(2) 3 (4) 5	$\frac{4}{12} = \frac{\square}{\square}$
2 3 4 5	$\frac{12}{15} = \frac{\square}{\square}$
2 3 4 5	$\frac{6}{9} = \frac{\square}{\square}$
2 3 4 5	$\frac{4}{10} = \frac{\square}{\square}$
2 3 4 5	$\frac{5}{10} = \frac{\square}{\square}$

Reduce to lowest terms.

$\frac{2}{4} =$	$\frac{2}{6} =$
$\frac{3}{6} =$	$\frac{4}{6} =$
$\frac{2}{8} =$	$\frac{4}{8} =$
$\frac{6}{8} =$	$\frac{3}{9} =$
$\frac{6}{9} =$	$\frac{2}{10} =$
$\frac{5}{10} =$	$\frac{2}{12} =$
$\frac{3}{12} =$	$\frac{4}{12} =$
$\frac{6}{12} =$	$\frac{8}{12} =$
$\frac{9}{12} =$	$\frac{10}{12} =$

Counting by Fractional Parts

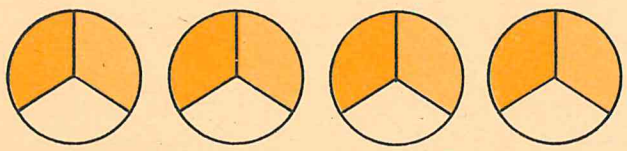


Counting by halves to $\frac{8}{2}$, you say:

$\frac{1}{2}, \frac{2}{2}, \frac{3}{2}, \frac{4}{2}, \frac{5}{2}, \frac{6}{2}, \frac{7}{2}, \frac{8}{2}$.

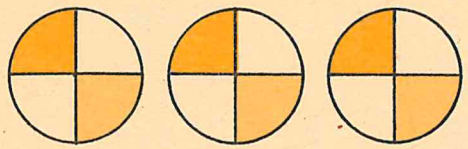
If you change improper fractions to whole numbers or mixed numbers in lowest terms, you say:

$\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4.



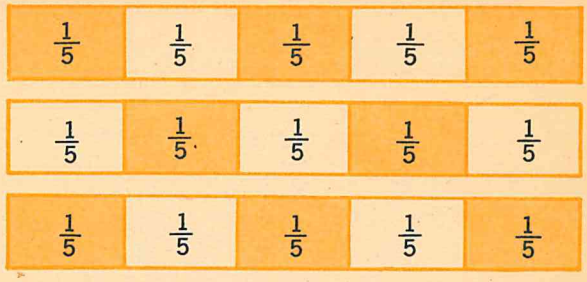
Count by thirds, and change improper fractions to whole numbers or mixed numbers in lowest terms.

$\frac{1}{3}, \frac{2}{3}, \frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square$



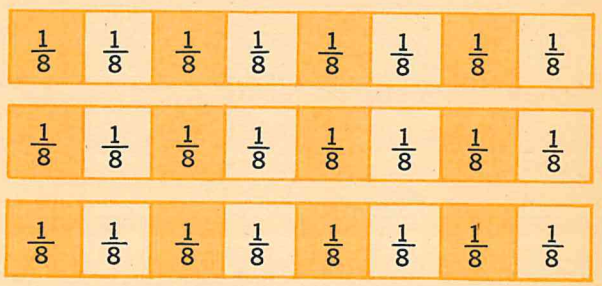
Count by fourths, and change improper fractions to whole numbers or mixed numbers in lowest terms.

$\frac{1}{4}, \frac{\square}{\square}, \frac{\square}{\square}, \square, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square$



Count by fifths, and change improper fractions to whole numbers or mixed numbers in lowest terms.

$\frac{1}{5}, \frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}, \square, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square$



Count by eighths, and change improper fractions to whole numbers or mixed numbers in lowest terms.

$\frac{1}{8}, \frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}, \square, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square\frac{\square}{\square}, \square$

A One-Digit Divisor and a Three-Digit Dividend

How many fours are there in 172?

4	4	4	4	4
× 10	× 20	× 30	× 40	× 50
40	80	120	160	200

Estimate: over 40

$40 \times 4 =$ 160

$3 \times 4 =$ 12

```
      3
     40
  4 | 172
      160
       12
       12
```

Answer: ☐☐

How many threes are there in 165?

3	3	3	3	3
× 10	× 20	× 30	× 40	× 50
☐	☐	☐	☐	☐

3 × 60 = ☐

Estimate: over ☐

☐☐ = estimate

3 | 165

☐☐☐ = estimate × 3

165 − ☐☐☐ = ☐☐

☐☐ = ■ threes

Answer: ☐☐

How many fours are there in 120?

4	4	4
× 10	× 20	× 30
☐	☐	☐

Answer: ☐☐

5	5
× 10	× 20
☐	☐
5	5
× 30	× 40
☐	☐

```
    ☐☐
  5 | 130
    ☐☐☐
     ☐☐
     ☐☐
```

Answer: ☐☐

6	6
× 10	× 20
☐	☐
6	6
× 30	× 40
☐	☐

```
    ☐☐
  6 | 192
    ☐☐☐
     ☐☐
     ☐☐
```

Answer: ☐☐

7	7
× 10	× 20
☐	☐
7	7
× 30	× 40
☐	☐

```
    ☐☐
  7 | 154
    ☐☐☐
     ☐☐
     ☐☐
```

Answer: ☐☐

8	8
× 10	× 20
☐	☐
8	8
× 30	× 40
☐	☐

```
    ☐☐
  8 | 280
    ☐☐☐
     ☐☐
     ☐☐
```

Answer: ☐☐

Problems

A factory that makes wooden boxes made 45 boxes on Monday, 35 boxes on Tuesday, 56 boxes on Wednesday, 24 boxes on Thursday, and 20 boxes on Friday. How many boxes were made that week?

Answer:

What was the average number of boxes made in a day?

Answer:

Mr. Jones bought 3 shirts that cost $2.59 each. How much money did he pay for them?

Answer: $

A dealer had 8400 pencils in stock. How many pencils were left after he shipped out 2544 pencils?

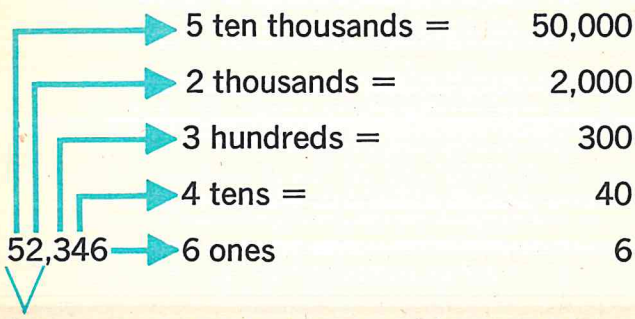
Answer:

A builder put up a row of 20 houses. Each house had 18 windows. How many windows were there altogether?

Answer:

Five-Digit Numerals

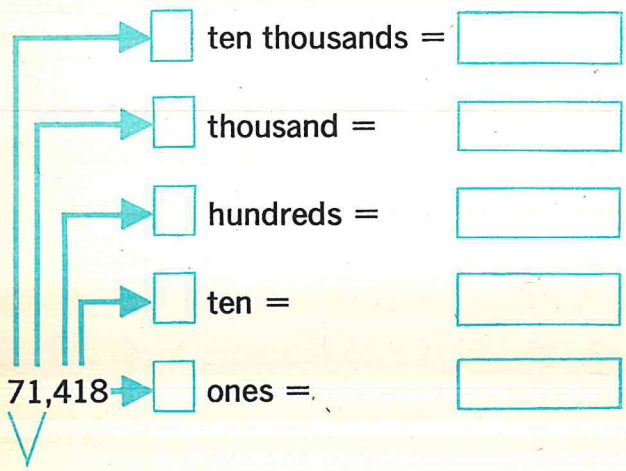
In a five-digit numeral, the fifth digit from the right shows the number of ten thousands.



These two digits together show 52 thousands.

In words: fifty-two thousand three hundred forty-six.

Show the meaning of the numeral below, and write it in words.



These two digits together show ☐ thousands.

In words: _____

_____

_____

_____

Write in numerals.

ten thousand = ☐

twenty thousand = ☐

forty thousand = ☐

Count by ten thousands.

10,000		

Count by thousands.

56,000 ☐ ☐ ☐

Count by hundreds.

49,800 ☐ ☐

☐ ☐ ☐

Count by tens.

59,970 ☐ ☐

☐ ☐ ☐

Write each number in numerals.

seventy-two thousand eight hundred fifty-two.

☐☐,☐☐☐

sixteen thousand two hundred eight.

☐☐,☐☐☐

5 ten thousands + 4 thousands
= 4 ten thousands + ☐ thousands.

3 ten thousands + 12 thousands
= ☐ ten thousands + 2 thousands.

Adding Numbers Written as Five-Digit Numerals

To add numerals with five digits, first add the ones. Then add the tens, the hundreds, the thousands, and the ten thousands, in that order.

You may have to exchange 10 ones for 1 ten, or 10 tens for 1 hundred, or 10 hundreds for 1 thousand, or 10 thousands for 1 ten thousand.

Example

$$\begin{array}{r} 42,516 \\ +\ 32,823 \\ \hline 39 \end{array}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 42,516 \\ +\ 32,823 \\ \hline 339 \end{array}$$

(5 + 8) hundreds
= 13 hundreds =
1 thousand + 3 hundreds

$$\begin{array}{r} {\scriptstyle 1} \\ 42,516 \\ +\ 32,823 \\ \hline \square\square,339 \end{array}$$

$$\begin{array}{r} 68,107 \\ +\ 9,126 \\ \hline \end{array} \qquad \begin{array}{r} 13,496 \\ +\ 25,825 \\ \hline \end{array} \qquad \begin{array}{r} 23,999 \\ +\ 1,001 \\ \hline \end{array} \qquad \begin{array}{r} 15,543 \\ +\ 12,670 \\ \hline \end{array}$$

$$\begin{array}{r} \$115.43 \\ +\ 219.26 \\ \hline \end{array} \qquad \begin{array}{r} \$241.99 \\ +\ 12.65 \\ \hline \end{array} \qquad \begin{array}{r} \$275.00 \\ +\ 145.50 \\ \hline \end{array} \qquad \begin{array}{r} \$499.99 \\ +\ .01 \\ \hline \end{array}$$

Add from the top down. Then check your answer by adding from the bottom up.

$$\begin{array}{r} 126 \\ 47 \\ 19 \\ +\ 225 \\ \hline \end{array} \qquad \begin{array}{r} 419 \\ 201 \\ 36 \\ +\ 9 \\ \hline \end{array} \qquad \begin{array}{r} 381 \\ 54 \\ 38 \\ +\ 112 \\ \hline \end{array}$$

$$\begin{array}{r} 265 \\ 80 \\ 90 \\ +\ 170 \\ \hline \end{array} \qquad \begin{array}{r} 169 \\ 29 \\ 38 \\ +\ 47 \\ \hline \end{array} \qquad \begin{array}{r} 250 \\ 250 \\ 350 \\ +\ 150 \\ \hline \end{array}$$

Write in vertical form, and add.

A. 271 + 18 + 365 + 9

B. $8.64 + $1.24 + $.56 + $.18

C. 206 + 5 + 46 + 113

A.	B.	C.

Subtracting Numbers Written as Five-Digit Numerals

Examples

$$\begin{array}{r} 31,816 \\ -\ 14,291 \\ \hline \end{array}$$

You cannot take away 9 from 1.
You cannot take away 4 from 1.
Exchange 1 hundred for 10 tens.
Exchange 1 ten thousand for 10 thousands.

$$\begin{array}{r} {}^{2}\cancel{3}\ {}^{11}1\ {}^{7}\cancel{8}\ {}^{11}1\ 6 \\ -\ 1\ 4,2\ 9\ 1 \\ \hline \square\square,\square\square\square \end{array}$$

You cannot take away 8 from 0, 6 from 0, or 4 from 0.	First exchange 1 ten thousand for 10 thousands.	Then exchange 1 thousand for 10 hundreds.	Then exchange 1 hundred for 10 tens.

$$\begin{array}{r} 60,009 \\ -\ 24,680 \\ \hline \end{array}$$

$$\begin{array}{r} {}^{5}\cancel{6}\ {}^{10}0,009 \\ -\ 24,680 \\ \hline \end{array}$$

$$\begin{array}{r} {}^{9}\cancel{5}\ {}^{10}0\ {}^{10}\cancel{0},009 \\ -\ 24,680 \\ \hline \end{array}$$

$$\begin{array}{r} {}^{9}\cancel{5}\ {}^{10}0\ {}^{9}\cancel{0}\ {}^{10}\cancel{0}9 \\ -\ 24,680 \\ \hline \end{array}$$

In the exercises below, make exchanges where you need them. Then subtract.

Answer: $\square\square,\square\square\square$

Check.

$$\begin{array}{r} 46,151 \\ -\ 12,029 \\ \hline \end{array}$$

Check.

$$\begin{array}{r} 23,157 \\ -\ 5,182 \\ \hline \end{array}$$

Check.

$$\begin{array}{r} \$241.19 \\ -\ 115.06 \\ \hline \end{array}$$

Check.

$$\begin{array}{r} \$300.00 \\ -\ .12 \\ \hline \end{array}$$

Check.

$$\begin{array}{r} \$116.95 \\ -\ 48.13 \\ \hline \end{array}$$

Check.

$$\begin{array}{r} \$205.07 \\ -\ 41.65 \\ \hline \end{array}$$

A Two-Digit Multiplier with a Two-Digit Multiplicand

Multiply.

$$\begin{array}{r} 24 \\ \times\ 48 \\ \hline \end{array}$$

The multiplier $48 = 40 + 8$.

Multiply by 8.

$$\begin{array}{r} 24 \\ \times\ \ 8 \\ \hline 192 \end{array}$$

Step I

Multiply by 40.

$$\begin{array}{r} 24 \\ \times\ 40 \\ \hline 960 \end{array}$$

Step II

Then add.

$$\begin{array}{r} 192 \\ +\ 960 \\ \hline \end{array}$$

Step III

To check the answer, interchange the multiplier and multiplicand, and then multiply in the same way.

$$\begin{array}{r} 48 \\ \times\ 24 \\ \hline \end{array}$$

The multiplier $24 = 20 + 4$.

Multiply by 4.

$$\begin{array}{r} 48 \\ \times\ \ 4 \\ \hline \end{array}$$

Step I

Multiply by 20.

$$\begin{array}{r} 48 \\ \times\ 20 \\ \hline \end{array}$$

Step II

Then add.

$$\begin{array}{r} \\ +\ \\ \hline \end{array}$$

Step III

Multiply. Then check by interchanging the multiplier and multiplicand.

$$\begin{array}{r} 27 \\ \times\ 36 \\ \hline \end{array}$$

The multiplier $36 = 30 + 6$.

Multiply by 6.

$$\begin{array}{r} 27 \\ \times\ \ 6 \\ \hline \end{array}$$

Multiply by 30.

$$\begin{array}{r} 27 \\ \times\ 30 \\ \hline \end{array}$$

Then add.

$$\begin{array}{r} \\ +\ \\ \hline \end{array}$$

Check.

$$\begin{array}{r} 36 \\ \times\ 27 \\ \hline \end{array}$$

$27 = 20 + 7$

Multiply by 7.

$$\begin{array}{r} 36 \\ \times\ \ 7 \\ \hline \end{array}$$

Multiply by 20

$$\begin{array}{r} 36 \\ \times\ 20 \\ \hline \end{array}$$

Then add.

$$\begin{array}{r} \\ +\ \\ \hline \end{array}$$

$$\begin{array}{r} 65 \\ \times\ 19 \\ \hline \end{array}$$

Check.

A Two-Digit Multiplier with a Two-Digit Multiplicand

Short way of arranging your work:

$$\begin{array}{r} 42 \\ \times\ 53 \\ \hline 126 \\ 2100 \\ \hline \square\square\square\square \end{array}$$

Step I—Multiply by 3.

Step II—Multiply by 50.

Step III—Add.

Check by interchanging multiplier and multiplicand.

$$\begin{array}{r} 53 \\ \times\ 42 \\ \hline \square\square\square \\ \square\square\square\square \\ \hline \square\square\square\square \end{array}$$

Multiply and check. Arrange your work in the short form used above.

21 Check. 16
× 16 × 21

34 Check.
× 26

15 Check.
× 18

17 Check.
× 19

25 Check.
× 25

31 Check.
× 42

61 Check.
× 16

54 Check.
× 13

17 Check.
× 18

25 Check.
× 19

24 Check.
× 12

13 Check.
× 12

A One-Digit Multiplier and a Four-Digit Multiplicand

Multiply 2×2167.

Estimate: about $2 \times 2000 =$ ☐

First Way

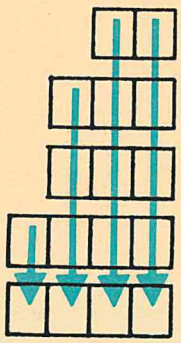
$2 \times 7 =$

$2 \times 60 =$

$2 \times 100 =$

$2 \times 2000 =$

2 1 6 7
× 2



2×7 ones $= 14$ ones

$=$ 1 ten $+ 4$ ones

2×6 tens $= 12$ tens

12 tens + 1 ten $= 13$ tens

13 tens $=$ 1 hundred $+ 3$ tens

2×1 hundred $= 2$ hundreds

2 hundreds + 1 hundred $= 3$ hundreds

2×2 thousands $= 4$ thousands

Short Way

2 1 6 7
× 2
4 3 3 4

Multiply by the short way. Check by using the first way.

Multiply 3×1452.

Estimate:
about 3×1000
$=$ ☐

1 4 5 2
× 3
☐☐☐☐

Check.

1 4 5 2
× 3

$3 \times 2 =$
$3 \times 50 =$
$3 \times 400 =$
$3 \times 1000 =$

Multiply 6×2134.

Estimate:
about 6×2000
$=$ ☐

2 1 3 4
× 6
☐☐☐☐☐

Check.

2 1 3 4
× 6

$6 \times 4 =$
$6 \times 30 =$
$6 \times 100 =$
$6 \times 2000 =$

Multiply 5×1021.

Estimate:
about 5×1000
$=$ ☐

1 0 2 1
× 5
☐☐☐☐

Check.

1 0 2 1
× 5

$5 \times 1 =$
$5 \times 20 =$
$5 \times 000 =$
$5 \times 1000 =$

Multiply $4 \times \$20.18$.

Estimate:
about $4 \times \$20$
$= \$$ ☐☐.

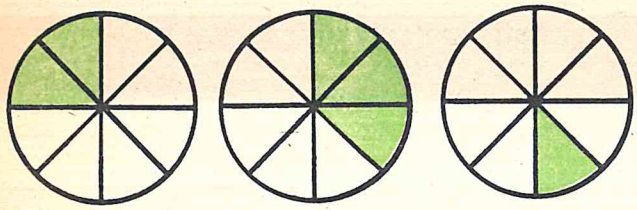
$ 2 0 . 1 8
× 4
$ ☐☐.☐☐

Check.

$ 2 0 . 1 8
× 4

$4 \times .08 =$
$4 \times .10 =$
$4 \times 0.00 =$
$4 \times 20.00 =$

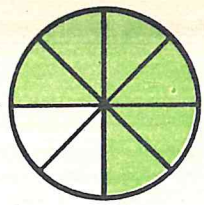
Adding Like Fractions



$\frac{2}{8}$ $\frac{3}{8}$ $\frac{1}{8}$

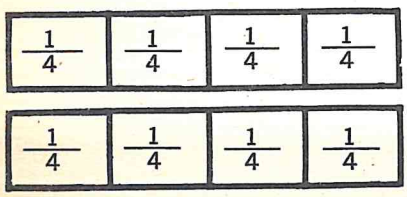
To add, put the colored parts side by side.

$\frac{2}{8} + \frac{3}{8} + \frac{1}{8} = \frac{6}{8}$



2 eighths
3 eighths
+ 1 eighth
6 eighths

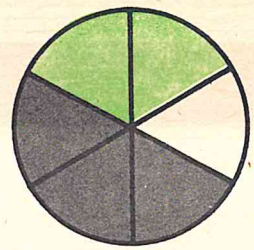
$\frac{2}{8}$
$\frac{3}{8}$
$+ \frac{1}{8}$
$\frac{6}{8}$



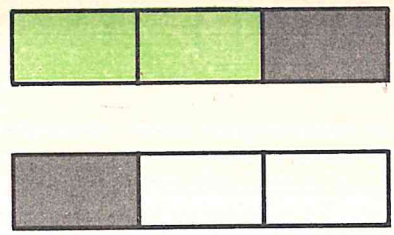
$\frac{2}{4}$
$\frac{2}{4}$
$+ \frac{2}{4}$
$\frac{\square}{4}$

Color 2 fourths. Next to them, color 2 more fourths. Then color 2 more fourths. Altogether you colored $\square$ fourths.

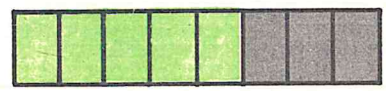
When you add fractions that have the same denominator, give the sum the same denominator. Add the numerators to get the numerator of the sum.



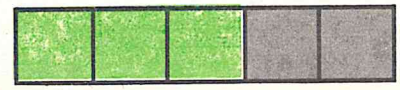
$\frac{2}{6}$
$+ \frac{3}{6}$
$\frac{\square}{6}$



$\frac{2}{3}$
$+ \frac{2}{3}$
$\frac{\square}{3}$

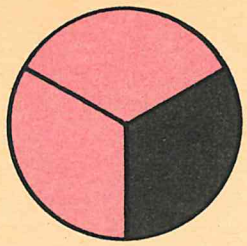


$\frac{5}{8}$
$+ \frac{5}{8}$
$\frac{\square}{\square}$

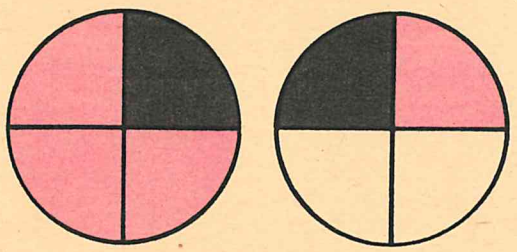


$\frac{3}{5}$
$+ \frac{3}{5}$
$\frac{\square}{\square}$

Adding Like Fractions



$$\frac{2}{3} + \frac{1}{3} = \frac{3}{3} = 1$$



$$\frac{3}{4} + \frac{2}{4} + \frac{1}{4} = \frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2}$$

Add each set of fractions. Where the sum is an improper fraction, change it to a whole number or a mixed number.

$\frac{1}{3} + \frac{1}{3} =$ ___

$\frac{2}{5} + \frac{1}{5} =$ ___

$\frac{1}{4} + \frac{2}{4} =$ ___

$\frac{1}{8} + \frac{4}{8} =$ ___

$\frac{1}{2} + \frac{1}{2} =$ ___ $=$ ___

$\frac{3}{5} + \frac{2}{5} =$ ___ $=$ ___

$\frac{2}{4} + \frac{1}{4} =$ ___ $=$ ___

$\frac{2}{7} + \frac{3}{7} =$ ___

$\frac{2}{10} + \frac{4}{10} =$ ___

$\frac{3}{12} + \frac{1}{12} =$ ___

$\frac{2}{9} + \frac{2}{9} =$ ___

$\frac{1}{6} + \frac{2}{6} =$ ___

$\frac{2}{8} + \frac{3}{8} =$ ___

$\frac{5}{10} + \frac{2}{10} =$ ___

$\frac{3}{8} + \frac{3}{8} =$ ___

$\frac{4}{5} + \frac{2}{5} + \frac{3}{5} =$ ___ $=$ ___

$\frac{4}{6} + \frac{1}{6} + \frac{1}{6} =$ ___ $=$ ___

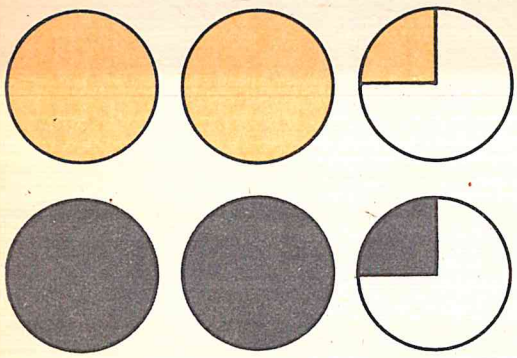
$\frac{2}{9} + \frac{4}{9} + \frac{6}{9} =$ ___ $=$ ___ $=$ ___

$\frac{2}{8} + \frac{3}{8} + \frac{1}{8} = \frac{\square}{8} = \frac{\square}{4}$

$\frac{4}{9} + \frac{4}{9} + \frac{4}{9} = \frac{\square}{9} = \square\frac{\square}{\square} = \square\frac{\square}{\square}$

$\frac{1}{3} + \frac{2}{3} = \frac{\square}{\square} = \square$

Adding Mixed Numbers with Like Fractions



$2\frac{1}{4}$

$+\ 2\frac{1}{4}$

$4\frac{2}{4}$

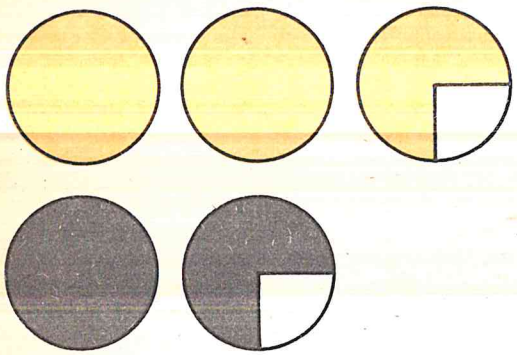
Add the whole numbers:

$2 + 2 = 4$

Add the fractions:

$\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$

$= 4\frac{1}{2}$



$2\frac{3}{4}$

$+\ 1\frac{3}{4}$

$3\frac{6}{4}$

$3\frac{6}{4} = 3 + 1\frac{2}{4} = 4\frac{2}{4} = 4\frac{1}{2}$

Add, and reduce to lowest terms.

$3\frac{3}{8}$

$+\ 4\frac{3}{8}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

$5\frac{1}{3}$

$+\ 4\frac{2}{3}$

$\square\frac{\square}{\square} = \square + \square = \square$

$5\frac{3}{4}$

$2\frac{1}{4}$

$+\ 4\frac{1}{4}$

$\square\frac{\square}{\square} = \square + \square\frac{\square}{\square}$

$= \square\frac{\square}{\square}$

$3\frac{1}{6}$

$2\frac{1}{6}$

$+\ 4\frac{2}{6}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

$6\frac{2}{3}$

$6\frac{2}{3}$

$+\ 6\frac{2}{3}$

$\square\frac{\square}{\square} = \square + \square$

$= \square$

$4\frac{1}{5}$

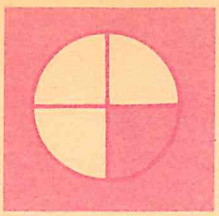
$5\frac{3}{5}$

$+\ 6\frac{2}{5}$

$\square\frac{\square}{\square} = \square + \square\frac{\square}{\square}$

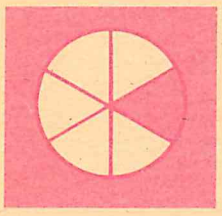
$= \square\frac{\square}{\square}$

Subtracting Like Fractions



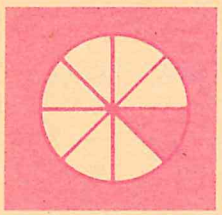
Fill in one fourth of the disk with crayon.

$\frac{3}{4} - \frac{1}{4} = \frac{\square}{4}$



Fill in two sixths of the disk with crayon.

$\frac{5}{6} - \frac{2}{6} = \frac{\square}{6}$



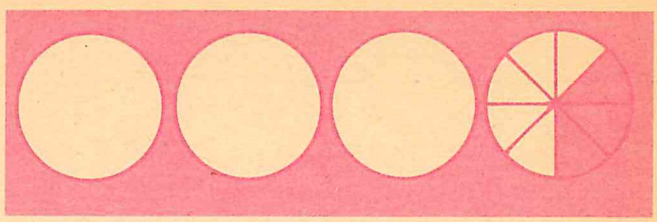
Fill in two eighths of the disk with crayon.

$\frac{7}{8} - \frac{2}{8} = \frac{\square}{\square}$

When you subtract fractions that have the same denominator, their difference has the same denominator. Subtract the numerators to get the numerator of the difference.

Subtract, and then reduce to lowest terms.

$\frac{7}{8}$ $-\frac{3}{8}$ $\frac{\square}{8} = \frac{\square}{\square}$	$\frac{8}{9}$ $-\frac{4}{9}$ $\frac{\square}{9}$	$\frac{5}{6}$ $-\frac{4}{6}$ $\frac{\square}{6}$
$\frac{7}{12}$ $-\frac{3}{12}$ $\frac{\square}{\square} = \frac{\square}{\square}$	$\frac{3}{4}$ $-\frac{2}{4}$ $\frac{\square}{\square}$	$\frac{6}{7}$ $-\frac{3}{7}$ $\frac{\square}{\square}$



Fill in one disk and two eighths of a disk with crayon.

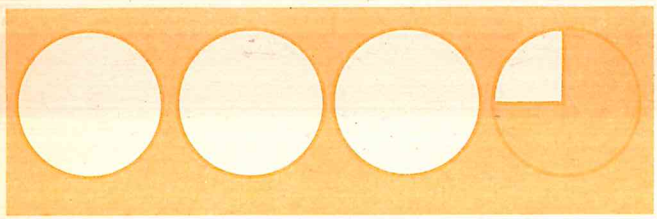
$3\frac{5}{8} - 1\frac{2}{8} = \square\frac{\square}{8}$

To subtract a mixed number, subtract the fraction in the subtrahend from the fraction in the minuend. Subtract the whole number in the subtrahend from the whole number in the minuend.

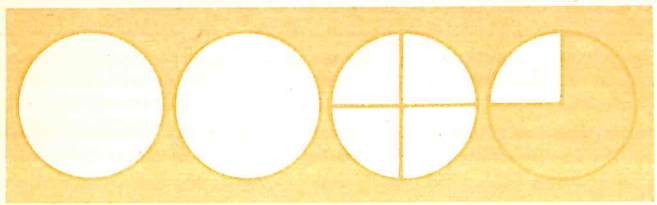
Subtract, and then reduce to lowest terms.

$7\frac{5}{8}$ $-2\frac{3}{8}$ $5\frac{2}{8} = 5\frac{1}{4}$	$12\frac{5}{6}$ $-4\frac{2}{6}$ $\square\frac{\square}{\square} = \square\frac{\square}{\square}$
$15\frac{8}{9}$ $-3\frac{5}{9}$ $\square\frac{\square}{\square} = \square\frac{\square}{\square}$	$24\frac{8}{12}$ $-9\frac{5}{12}$ $\square\frac{\square}{\square} = \square\frac{\square}{\square}$
$30\frac{3}{4}$ $-11\frac{1}{4}$ $\square\frac{\square}{\square} = \square\frac{\square}{\square}$	$8\frac{4}{5}$ $-2\frac{2}{5}$ $\square\frac{\square}{\square}$

Subtracting Like Fractions with Exchange



Here are $3\frac{1}{4}$ disks. Take away $1\frac{3}{4}$ disks. There is only 1 fourth, and you have to take away 3 fourths. To get more fourths, draw lines that divide one of the disks into fourths. In this way you exchange 1 whole for 4 fourths. Then the diagram looks like this:



$$3\frac{1}{4} = 2\frac{5}{4}$$

Now you can take away $1\frac{3}{4}$. Fill in $1\frac{3}{4}$ disks with your crayon.

$$2\frac{5}{4} - 1\frac{3}{4} = \square\frac{\square}{\square} = \square\frac{\square}{\square}$$

You can also arrange the work like this:

$$\begin{array}{r} 3\frac{1}{4} = \quad 2\frac{5}{4} \\ -\ 1\frac{3}{4} = -\ 1\frac{3}{4} \\ \hline \square\frac{\square}{\square} = \square\frac{\square}{\square} \end{array}$$

Exchange 1 for 8 eighths.

$$6\frac{1}{8} = 5 + \frac{8}{8} + \frac{1}{8} = 5\frac{9}{8}$$

$$4\frac{2}{8} = 3 + \frac{8}{8} + \frac{2}{8} = 3\frac{10}{8}$$

Exchange 1 for $\square$ sixths.

$$9\frac{1}{6} = 8 + \frac{\square}{6} + \frac{1}{6} = 8\frac{\square}{6}$$

$$12\frac{2}{6} = 11 + \frac{\square}{6} + \frac{2}{6} = 11\frac{\square}{6}$$

Exchange 1 for $\square$ fifths.

$$4\frac{2}{5} = 3 + \frac{\square}{5} + \frac{2}{5} = 3\frac{\square}{5}$$

$$8\frac{1}{5} = 7 + \frac{\square}{5} + \frac{1}{5} = 7\frac{\square}{5}$$

Subtract, and reduce to lowest terms.

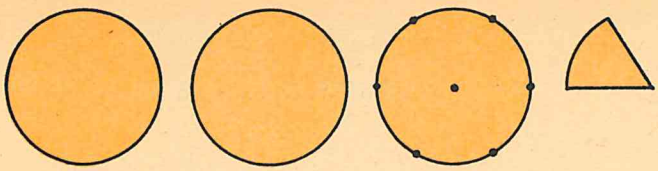
$$\begin{array}{r} 13\frac{1}{6} = \quad 12\frac{\square}{6} \\ -\ 4\frac{3}{6} = -\ 4\ \frac{3}{6} \\ \hline \square\frac{\square}{\square} = \square\frac{\square}{\square} \end{array}$$

$$\begin{array}{r} 21\frac{1}{4} = \quad 20\frac{\square}{4} \\ -\ 5\frac{2}{4} = -\ 5\ \frac{2}{4} \\ \hline \square\frac{\square}{\square} \end{array}$$

$$\begin{array}{r} 8\frac{1}{3} = \quad \square\frac{\square}{3} \\ -\ 2\frac{2}{3} = -\ 2\ \frac{2}{3} \\ \hline \square\frac{\square}{\square} \end{array}$$

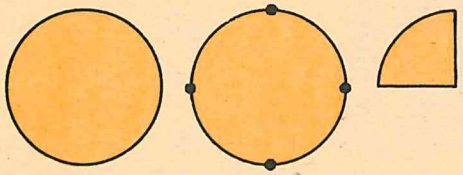
$$\begin{array}{r} 27\frac{1}{8} = \quad \square\frac{\square}{8} \\ -\ 8\frac{3}{8} = -\ 8\ \frac{3}{8} \\ \hline \square\frac{\square}{\square} = \square\frac{\square}{\square} \end{array}$$

Subtracting Like Fractions with Exchange



Change the last whole disk into sixths by joining dots.

$3\frac{1}{6} = 2\frac{\square}{6}$



Change the last whole disk into fourths by joining dots.

$2\frac{1}{4} = 1\frac{\square}{4}$

Exchange 1 for $\square$ ninths.

$12\frac{2}{9} = 11\frac{\square}{9}$	$5\frac{3}{9} = 4\frac{\square}{9}$
$7\frac{3}{9} = \square\frac{\square}{9}$	$10\frac{2}{9} = \square\frac{\square}{9}$

Exchange 1 for $\square$ twelfths.

$7\frac{1}{12} = 6\frac{\square}{12}$	$9\frac{3}{12} = 8\frac{\square}{12}$
$21\frac{4}{12} = \square\frac{\square}{12}$	$11\frac{2}{12} = \square\frac{\square}{12}$
$8\frac{1}{7} = 7\frac{\square}{7}$	$12\frac{2}{7} = \square\frac{9}{7}$
$9\frac{1}{4} = 8\frac{\square}{4}$	$6\frac{2}{4} = \square\frac{6}{4}$
$6\frac{1}{10} = 5\frac{\square}{10}$	$12\frac{3}{10} = \square\frac{13}{\square}$
$5\frac{2}{8} = 4\frac{\square}{8}$	$8\frac{1}{8} = \square\frac{9}{8}$

Subtract, and reduce to lowest terms.

$$\begin{array}{r} 31\frac{1}{6} \\ -\ 12\frac{2}{6} \\ \hline \end{array} = \begin{array}{r} 30\frac{\square}{6} \\ -\ 12\frac{2}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 15\frac{1}{4} \\ -\ 4\frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 22\frac{3}{8} \\ -\ 2\frac{5}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 6\frac{1}{10} \\ -\ 1\frac{5}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 10\frac{2}{5} \\ -\ 4\frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 20\frac{1}{12} \\ -\ 9\frac{7}{12} \\ \hline \end{array}$$

Multiplying by 100

$100 \times 2 = 2 \times 100 = 200$

$100 \times 3 = 3 \times 100 = 300$

$100 \times 4 = \square \times 100 = \square$

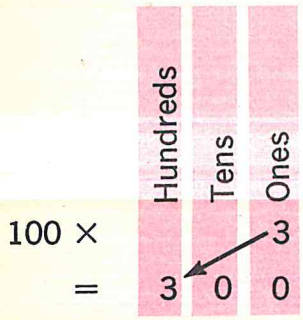
$100 \times 5 = \square \times 100 = \square$

$100 \times 6 = \square \times 100 = \square$

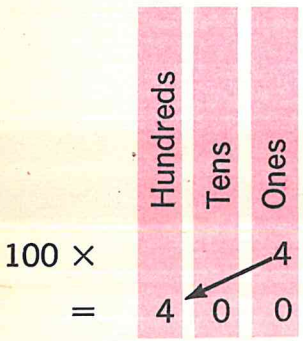
$100 \times 7 = \square \times 100 = \square$

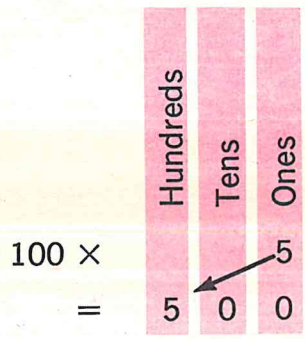
$100 \times 8 = \square \times 100 = \square$

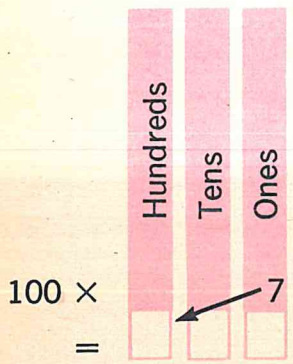
$100 \times 9 = \square \times 100 = \square$

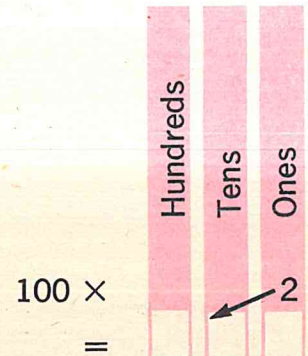


Multiplying 3 by 100 changes 3 ones to 3 hundreds. The 3 moves two places to the left, a 0 holds the ones place, and a 0 holds the tens place.





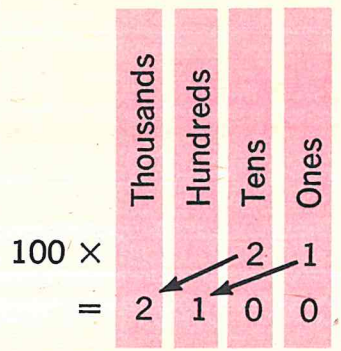




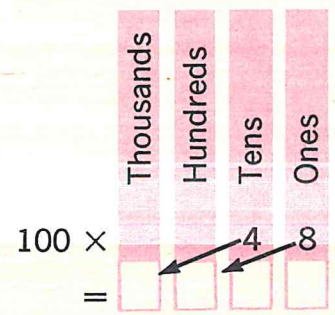
$100 \times 21 = 21 \times 100 = 21$ hundreds

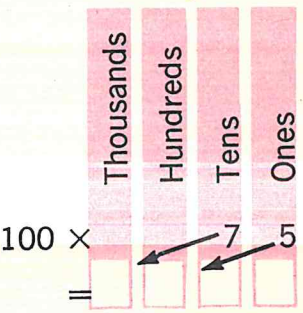
$= 20$ hundreds $+ 1$ hundred

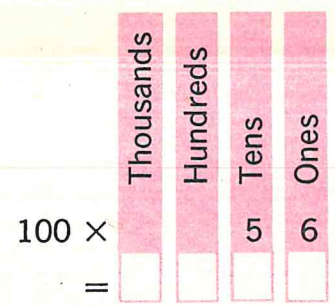
$= 2$ thousands $+ 1$ hundred $= 2100$

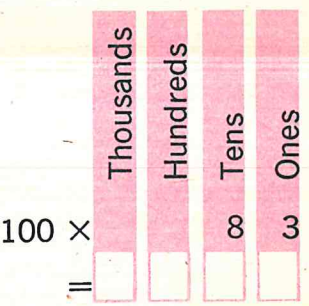


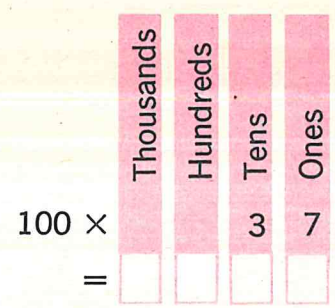
Multiplying a number by 100 moves each digit two places to the left, and zeros hold the places for ones and tens.

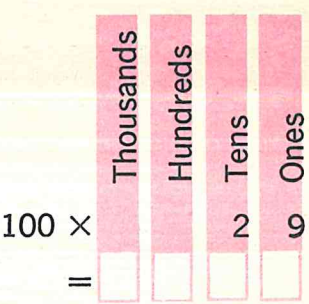


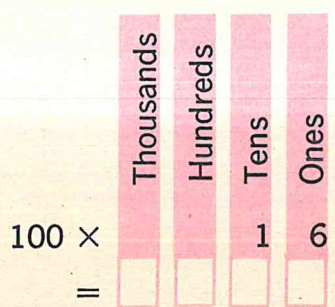


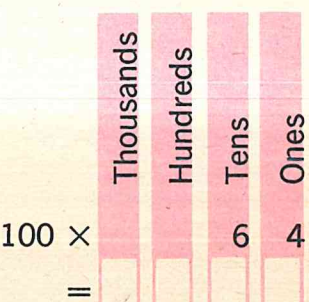












Multiplying by Multiples of 100

$200 \times 3 = 2 \times (100 \times 3)$

$= 2 \times 300 = 600$

Multiplying by 200 is like multiplying first by 100, and then by 2.

3

× 2 0 0

6 0 0 ← first put down two zeros

To multiply by 200, and move left two places. This is like multiplying by 100.

Then multiply by 2.

$400 \times 7 = 4 \times (100 \times 7)$

$= 4 \times 700 =$ ☐

Multiplying by 400 is like multiplying first by 100 and then by 4.

7

× 4 0 0

0 0

Put down 2 zeros.

Move 2 places left, and multiply by 4.

8

× 5 0 0

0 0

Put down 2 zeros.

Move 2 places left, and multiply by 5.

6

× 8 0 0

0 0

Put down 2 zeros.

Move 2 places left, and multiply by 8.

5

× 3 0 0

Put down 2 zeros.

Move 2 places left, and multiply by 3.

---

1 4

× 6 0 0

Put down 2 zeros.

Move 2 places left, and multiply by ☐.

---

1 3

× 7 0 0

Put down 2 zeros.

Move ☐ places left and multiply by ☐.

2

× 9 0 0

Put down 2 zeros.

Move ☐ places left, and multiply by ☐.

---

1 2

× 3 0 0

2 1

× 4 0 0

1 5

× 6 0 0

3 1

× 2 0 0

1 4

× 5 0 0

1 1

× 7 0 0

$800 \times 9 =$ ☐ $400 \times 6 =$ ☐

A One-Digit Divisor and a Quotient in the Hundreds

1296 tomatoes were packed into boxes with three tomatoes in each box. How many boxes were needed? You must find out how many threes there are in 1296.

3	3	3	3
× 100	× 200	× 300	× 400
300	600	900	1200

3	1500 is too large.
× 500	Estimate: over 400 boxes.
1500	

400 boxes used up 1200 tomatoes.

96 tomatoes are left. How many threes are there in 96?

3	3
× 10	× 20
□	□

3	3
× 30	× 40
□	□

2	
30	
400	
3 ⟌ 1296	
1200	= 400 × 3
96	
90	= 30 × 3
6	
6	= 2 × 3

400 + 30 + 2 = 432.

432 boxes are needed.

1st Correction: 30 more boxes are needed. 30 boxes use 90 tomatoes. 6 tomatoes are left. How many threes are there in 6?

2 × 3 = 6

2nd Correction: 2 more boxes are needed.

Rule: Find the answer in 4 steps:

I Estimate: a number of hundreds.

II 1st Correction: a number of tens.

III 2nd Correction: a number of ones.

IV Add the estimate and corrections.

How many fours are there in 864?

4
× 100
□

4	4
× 200	× 300
□	□

4	4
× 10	× 20
□	□

Answer: □

□	
□	0
□	0 0
4 ⟌ 8 6 4	
□□□	
□□	
□□	
□□	
□□	
□	

How many fives are there in 625?

5	5
× 100	× 200
□	□

5	5
× 10	× 20
□	□

5
× 30
□

Answer: □

□	
□□	
□□□	
5 ⟌ 6 2 5	
□□□	
□□□	
□□□	
□□	
□□	
□	

Dividend Less than the Divisor

How many groups of 6 stars can be made from 5 stars? There are not enough stars to make any groups of 6. So the answer is 0 groups, and 5 stars left.

$$6 \overline{)\,5}$$ 0 and 5 left

$$9 \overline{)\,3}$$ ☐ and ☐ left

$$8 \overline{)\,5}$$ ☐ and ☐ left

$$6 \overline{)\,3}$$ ☐ and ☐ left

$$7 \overline{)\,4}$$ 0 and ☐ left

$$5 \overline{)\,2}$$ ☐ and ☐ left

$$8 \overline{)\,2}$$ 0 and ☐ left

$$4 \overline{)\,3}$$ ☐ and ☐ left

Practice Exercises with One-Digit Divisor and a Quotient in the Hundreds

$$6 \times 100 = \square$$

$$6 \times 200 = \square \qquad 6 \times 300 = \square$$

$$6 \times 10 = \square \qquad 6 \times 20 = \square$$

Answer: ☐

$$6 \overline{)\,1272}$$

$$7 \times 100 = \square \qquad 7 \times 200 = \square$$

$$7 \times 300 = \square \qquad 7 \times 400 = \square$$

$$7 \times 10 = \square \qquad 7 \times 20 = \square \qquad 7 \times 30 = \square$$

Answer: ☐

$$7 \overline{)\,2254}$$

A Two-Digit Divisor and a Two-Digit Dividend

$$15 \overline{)\ 75}$$

$10 \times 15 = 150$, which is too large. Try smaller estimates.

$$\begin{array}{r} 15 \\ \times\ 4 \\ \hline \square \end{array} \qquad \begin{array}{r} 15 \\ \times\ 5 \\ \hline \square \end{array}$$

$$21 \overline{)\ 86}$$ □ and □ left

$10 \times 21 = 210$ (too large)

$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline \square \end{array} \qquad \begin{array}{r} 21 \\ \times\ 4 \\ \hline \square \end{array} \qquad \begin{array}{r} 21 \\ \times\ 5 \\ \hline \square \end{array}$$

$$32 \overline{)\ 99}$$ □ and □ left

$10 \times 32 =$ □ (too large)

$$\begin{array}{r} 32 \\ \times\ 2 \\ \hline \square \end{array} \qquad \begin{array}{r} 32 \\ \times\ 3 \\ \hline \square \end{array} \qquad \begin{array}{r} 32 \\ \times\ 4 \\ \hline \square \end{array}$$

$$18 \overline{)\ 75}$$ □ and □ left

$10 \times 18 =$ □ (too large)

$$\begin{array}{r} 18 \\ \times\ 3 \\ \hline \square \end{array} \qquad \begin{array}{r} 18 \\ \times\ 4 \\ \hline \square \end{array} \qquad \begin{array}{r} 18 \\ \times\ 5 \\ \hline \square \end{array}$$

Divide and check.

$$\begin{array}{r} 8 \\ \times\ 100 \\ \hline 800 \end{array} \qquad \begin{array}{r} 8 \\ \times\ 200 \\ \hline 1600 \end{array}$$

$$\begin{array}{r} 8 \\ \times\ 30 \\ \hline 240 \end{array} \qquad \begin{array}{r} 8 \\ \times\ 40 \\ \hline 320 \end{array}$$

$5 \times 8 = 40$

$$\begin{array}{r} 135 \\ 8 \overline{)\ 1082} \\ 800 \\ \hline 282 \\ 240 \\ \hline 42 \\ 40 \\ \hline 2 \end{array}$$

Add

Answer: 135 and 2 left

First Method of Checking

$100 \times 8 = 800$

$30 \times 8 = 240$

$5 \times 8 = 40$

remainder $= 2$

□□□□

Second Method of Checking

Find $(135 \times 8) + 2$,

(quotient × divisor) + remainder.

$135 \times 8 = 8 \times 135$

$$\begin{array}{r} 135 \\ \times\ 8 \\ \hline \square\square\square\square \\ +\quad 2 \\ \hline \square\square\square\square \end{array}$$

Compare the result with the dividend.

Roman Numerals Up to 300

C = ☐ L = ☐

X = ☐ V = ☐

CC = ☐ + ☐ = ☐

CCC = ☐ + ☐ + ☐ = ☐

CL = ☐ + ☐ = ☐

CCL = 200 + ☐ = ☐

CXC = 100 + ☐ = ☐

CXL = 100 + ☐ = ☐

Write in Arabic Numerals.

CLXXX = ☐ CXCI = ☐

CCXIV = ☐ CCLII = ☐

CLXIX = ☐ CXIII = ☐

CI = ☐ CCXXIV = ☐

CV = ☐ CXVII = ☐

CX = ☐ CCXIX = ☐

CCXX = ☐ CXLI = ☐

CCIV = ☐ CLXXV = ☐

Write in Roman Numerals.

100 = ☐ 150 = ☐

200 = ☐ 140 = ☐

190 = ☐ 160 = ☐

105 = ☐ 170 = ☐

110 = ☐ 165 = ☐

102 = ☐ 214 = ☐

290 = ☐ 203 = ☐

Divide and check.

7 × 100 = ☐

7 × 200 = ☐

7 × 10 = ☐

7 × 20 = ☐

7 × 30 = ☐

7 ⟌ 8 8 2

Answer: ☐

Check by addition.

☐ + ☐ = ☐

Check by multiplication.

☐ × 7 = ☐

Subtract, and reduce to lowest terms.

$15\frac{2}{8} = \square\frac{\square}{8}$

$-\ 3\frac{5}{8} = -\ 3\ \frac{5}{8}$

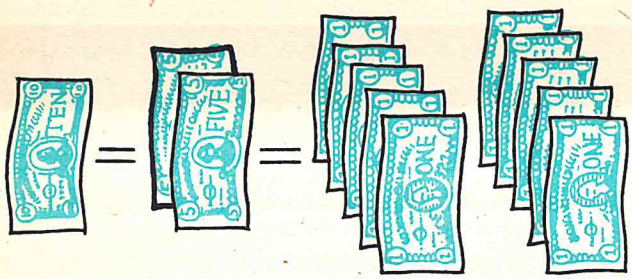
$\square\frac{\square}{8}$

$8\frac{1}{6} = \square\frac{\square}{6}$

$-\ 3\frac{4}{6} = -\ 3\ \frac{4}{6}$

$\square\frac{\square}{6} = \square\frac{\square}{\square}$

Change of Ten Dollars



A ten-dollar bill is worth as much as 2 five-dollar bills or 10 one-dollar bills.

1 ten-dollar bill = 1 five-dollar bill + ☐ one-dollar bills.

1 ten-dollar bill = 1 five-dollar bill + 4 one-dollar bills + ☐ half-dollars.

1 ten-dollar bill = 1 five-dollar bill + 4 one-dollar bills + ☐ quarters.

1 ten-dollar bill = 1 five-dollar bill + 3 one-dollar bills + ☐ quarters.

A man made a purchase for $7.19. He paid for it with a ten-dollar bill. To make change, the clerk first counted by pennies from $7.19 to $7.20: ☐ penny.

Then he counted by nickels to $7.25: ☐ nickel.

Then he counted by quarters to $8.00: ☐ quarters.

Then he counted by dollars to $10.00: ☐ dollars.

The clerk gave ☐ penny, ☐ nickel, ☐ quarters, and ☐ dollars for change.

The change was worth $ ☐ . ☐ ☐ .

Count by dollars.

$3.15 $4.15 ☐ ☐ ☐

Count by half dollars.

$7.50 $8.00 ☐ ☐ ☐

Count by quarters.

$5.50 $5.75 ☐ ☐ ☐

Count by dimes.

$9.60 $9.70 ☐ ☐ ☐

Count by nickels.

$6.30 $6.35 ☐ ☐ ☐

Count by pennies.

$7.96 $7.97 ☐ ☐ ☐

A lady made a purchase for $8.41. She paid for it with a ten-dollar bill. To make change, the clerk first counted by pennies from $8.41 to $8.45: ☐ pennies.

Then he counted by nickels to $8.50: ☐ nickel.

Then he counted by quarters to $9.00: ☐ quarters.

Then he counted by dollars to $10.00: ☐ dollar.

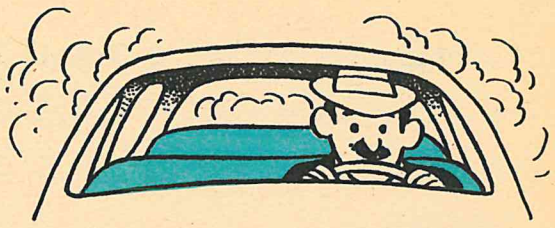
The change was worth $ ☐ . ☐☐ .

Problems

John put up two shelves in his workshop. One shelf was $4\frac{3}{4}$ feet long. The other shelf was $6\frac{3}{4}$ feet long. How many feet of lumber did he use for the two shelves?

Answer:

Mr. Jones traveled 12,165 miles in his car during the first year he owned it. He traveled 9,862 miles during the second year. How many miles did he travel in those two years?



Answer:

How many more miles will Mr. Jones's car travel before the total mileage is 30,000 miles?

Answer:

Mary had a piece of ribbon that was $24\frac{1}{4}$ inches long. She cut off a piece that was $2\frac{3}{4}$ inches long. How long was the piece that was left?

Answer:

The number of inches of rain that fell in New York City during each year from 1953 to 1957 is shown below. What was the average per year?

Year	Rainfall
1953	46 in.
1954	43 in.
1955	38 in.
1956	40 in.
1957	33 in.
Total:	in.

Answer:

Six-Digit Numerals

In a six-digit numeral, the sixth digit from the right shows the number of hundred thousands.

2 hundred thousands =	2 0 0,0 0 0
7 ten thousands =	7 0,0 0 0
8 thousands =	8,0 0 0
4 hundreds =	4 0 0
2 tens =	2 0
5 ones =	5

278,425

These three digits together show 278 thousand.

In words: two hundred seventy-eight thousand four hundred twenty-five.

Show the meaning of the numeral below, and write it in words:

☐ hundred thousands = ☐☐☐,☐☐☐

☐ ten thousand = ☐☐,☐☐☐

☐ thousands = ☐,☐☐☐

☐ hundred = ☐☐☐

☐ tens = ☐☐

☐ ones = ☐

413,165

These three digits together show ☐☐☐ thousands.

In words: _____

_____

_____

_____

Write in numerals.

one hundred thousand = ☐☐☐,☐☐☐

two hundred thousand = ☐☐☐,☐☐☐

five hundred thousand = ☐☐☐,☐☐☐

Count by hundred thousands.

100,000	☐☐☐,☐☐☐	☐☐☐,☐☐☐
☐☐☐,☐☐☐	☐☐☐,☐☐☐	☐☐☐,☐☐☐
☐☐☐,☐☐☐	☐☐☐,☐☐☐	☐☐☐,☐☐☐

Count by ten thousands.

260,000	☐☐☐,☐☐☐	☐☐☐,☐☐☐
☐☐☐,☐☐☐	☐☐☐,☐☐☐	☐☐☐,☐☐☐

Count by thousands.

298,000	☐☐☐,☐☐☐	☐☐☐,☐☐☐
☐☐☐,☐☐☐	☐☐☐,☐☐☐	☐☐☐,☐☐☐

Count by hundreds.

499,800	☐☐☐,☐☐☐	☐☐☐,☐☐☐
☐☐☐,☐☐☐	☐☐☐,☐☐☐	☐☐☐,☐☐☐

Write each number in numerals.

four hundred thirty-two thousand
six hundred eighteen

= ☐☐☐,☐☐☐

eight hundred thousand
four hundred two

= ☐☐☐,☐☐☐

6 hundred thousands + 2 ten thousands =

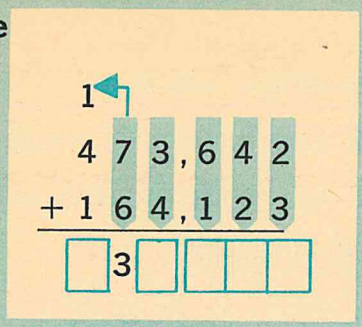
5 hundred thousands + ☐ ten thousands

4 hundred thousands + 13 ten thousands =

☐ hundred thousands + 3 ten thousands

Adding Numbers Written as Six-Digit Numerals

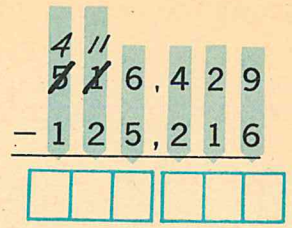
Example



13 ten thousands
= 1 hundred thousand + 3 ten thousands

Subtracting Numbers Written as Six-Digit Numerals

Example



5 hundred thousands + 1 ten thousand
= 4 hundred thousands + 11 ten thousands

Add.

2 0 4,8 1 6 + 1 7 8,3 1 9	1 0 0,5 0 8 + 2 0 0,4 1 5
6 5 4,3 2 1 + 2 7 7,1 2 3	3 9 9,9 9 9 + 1 0 0,0 0 1
$ 2 4 3 5.4 2 + 1 7 2 5.1 7	$ 5 1 5 6.0 9 + 2 4 3 8.2 8

451,246 20,117 5,309 16 + 13,121	100,000 20,000 410,506 15,100 + 8,109

Subtract.

258,169 − 135,417	400,000 − 125,376

Subtract, and check by adding.

Check.

324,117
− 111,652

Check.

250,000
− 6,113

Check.

100,000
− 1

A One-Digit Multiplier and a Five-Digit Multiplicand

Multiply $6 \times 42{,}315$.

Estimate: about $6 \times 40{,}000 =$ ☐

First Way

$$\begin{array}{r} 42{,}315 \\ \times \quad\quad 6 \\ \hline \end{array}$$

$6 \times 5 =$ ☐

$6 \times 10 =$ ☐

$6 \times 300 =$ ☐

$6 \times 2000 =$ ☐

$6 \times 40{,}000 =$ ☐

☐

Short Way

Use the method shown on page 43, and carry it one step further. Exchange 10 thousands for 1 ten thousand, and add it to the product of $6 \times 40{,}000$.

$$\begin{array}{r} 42{,}315 \\ \times \quad\quad 6 \\ \hline \end{array}$$

☐

Multiply by the short way. Check by using the first way.

Multiply $5 \times 13{,}416$.

Estimate:

about $5 \times 10{,}000 =$ ☐

Short Way

$$\begin{array}{r} 13{,}416 \\ \times \quad\quad 5 \\ \hline \end{array}$$

☐

Check.

$$\begin{array}{r} 13{,}416 \\ \times \quad\quad 5 \\ \hline \end{array}$$

$5 \times 6 =$ ☐

$5 \times 10 =$ ☐

$5 \times 400 =$ ☐

$5 \times 3000 =$ ☐

$5 \times 10{,}000 =$ ☐

☐

Multiply by the short way.

$\begin{array}{r} 21{,}419 \\ \times \quad\quad 4 \\ \hline \end{array}$ ☐	$\begin{array}{r} 32{,}115 \\ \times \quad\quad 3 \\ \hline \end{array}$ ☐	$\begin{array}{r} 40{,}262 \\ \times \quad\quad 7 \\ \hline \end{array}$ ☐
$\begin{array}{r} 34{,}720 \\ \times \quad\quad 2 \\ \hline \end{array}$ ☐	$\begin{array}{r} 10{,}425 \\ \times \quad\quad 9 \\ \hline \end{array}$ ☐	$\begin{array}{r} 11{,}146 \\ \times \quad\quad 8 \\ \hline \end{array}$ ☐

A Two-Digit Multiplier and a Three-Digit Multiplicand

Multiply.	Multiply by 4.	Multiply by 20.	Then add.
1 6 2 × 2 4	1 6 2 × 4 6 4 8	1 6 2 × 2 0 3 2 4 0	6 4 8 + 3 2 4 0
The multiplier 24 = 20 + 4	Step I	Step II	Step III
2 1 8 × 1 3 13 = 10 + 3	Multiply by 3. 2 1 8 × 3	Multiply by 10. 2 1 8 × 1 0	Then add. +
3 4 5 × 2 1 21 = 20 + 1	Multiply by 1.	Multiply by 20.	Then add.
4 1 7 × 3 8	Multiply by ☐	Multiply by ☐	Then add.
8 0 6 × 1 7	Multiply by ☐	Multiply by ☐	Then add.
7 2 5 × 4 5	Multiply by ☐	Multiply by ☐	Then add.

A Two-Digit Multiplier and a Three-Digit Multiplicand, the Short Way

Arrange your work this way:

Step I—Multiply by 6.

Step II—Multiply by 20.

Step III—Add.

$$\begin{array}{r} 145 \\ \times\ 26 \\ \hline 870 \\ 2900 \\ \hline \square\square\square\square \end{array}$$

Step I—Multiply by $\square$

Step II—Multiply by $\square\square$

Step III—Add.

$$\begin{array}{r} 215 \\ \times\ 37 \\ \hline \square\square\square\square \\ \square\square\square\square \\ \hline \square\square\square\square \end{array}$$

Multiply in the short way.

$$\begin{array}{r} 452 \\ \times\ 16 \\ \hline \square\square\square\square \\ \square\square\square\square \\ \hline \square\square\square\square \end{array}$$

$$\begin{array}{r} 312 \\ \times\ 21 \end{array}$$

$$\begin{array}{r} 405 \\ \times\ 15 \end{array}$$

$$\begin{array}{r} 625 \\ \times\ 25 \end{array}$$

$$\begin{array}{r} 128 \\ \times\ 12 \end{array}$$

$$\begin{array}{r} 225 \\ \times\ 15 \end{array}$$

$$\begin{array}{r} 121 \\ \times\ 11 \end{array}$$

$$\begin{array}{r} 169 \\ \times\ 13 \end{array}$$

Change to lower terms.

$\frac{4}{8} = \frac{\square}{4} = \frac{\square}{2}$

$\frac{4}{6} = \frac{\square}{\square\square}$

$\frac{4}{10} = \frac{\square}{\square\square}$

$\frac{5}{10} = \frac{\square}{\square\square}$

$\frac{6}{9} = \frac{\square}{\square\square}$

$\frac{2}{6} = \frac{\square}{\square\square}$

Change to higher terms.

$\frac{1}{2} = \frac{\square}{4}$

$\frac{3}{4} = \frac{\square}{8}$

$\frac{2}{3} = \frac{\square}{6}$

$\frac{1}{5} = \frac{\square}{10}$

$\frac{1}{3} = \frac{\square}{6}$

$\frac{1}{3} = \frac{\square}{9}$

Cross out the fraction that does not belong. Then complete the rest.

$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{5} = \frac{\square}{6}$

$\frac{2}{3} = \frac{\square}{6} = \frac{\square}{9} = \frac{\square}{10}$

$\frac{3}{4} = \frac{\square}{5} = \frac{\square}{8} = \frac{\square}{12}$

$\frac{1}{4} = \frac{\square}{8} = \frac{\square}{2} = \frac{\square}{12}$

$\frac{1}{6} = \frac{\square}{3} = \frac{\square}{12} = \frac{\square}{18}$

Higher Terms

To change a fraction to higher terms, multiply the numerator and denominator by 2 or 3 or 4 or 5, and so on.

$\frac{1}{2} = \frac{2 \times 1}{2 \times 2}$ or $\frac{3 \times 1}{3 \times 2}$ or $\frac{4 \times 1}{4 \times 2}$ or $\frac{5 \times 1}{5 \times 2}$ . . .

$= \frac{2}{4}$ or $\frac{3}{6}$ or $\frac{4}{8}$ or $\frac{5}{10}$ . . .

The higher denominators are 4, 6, 8, 10, . . .

They are the numbers you get when you count by twos.

$\frac{1}{3} = \frac{2 \times 1}{2 \times 3}$ or $\frac{3 \times 1}{3 \times 3}$ or $\frac{4 \times 1}{4 \times 3}$ or $\frac{5 \times 1}{5 \times 3}$ . . .

$= \frac{2}{6}$ or $\frac{3}{9}$ or $\frac{4}{12}$ or $\frac{5}{15}$ . . .

The higher denominators are 6, 9, 12, 15, . . .

They are the numbers you get when you count by threes.

$\frac{3}{4}$ may be changed to fractions with denominators 8 ☐ ☐ ☐

To answer, count by fours.

$\frac{3}{4} = \frac{\square}{8}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$

$\frac{2}{5}$ may be changed to fractions with denominators 10 ☐ ☐ ☐

To answer, count by fives.

$\frac{2}{5} = \frac{\square}{10}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$

$\frac{1}{6}$ may be changed to fractions with denominators 12 ☐ ☐ ☐

To answer count by sixes.

$\frac{1}{6} = \frac{\square}{12}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$

$\frac{3}{7}$ may be changed to fractions with denominators 14 ☐ ☐ ☐

To answer count by sevens.

$\frac{3}{7} = \frac{\square}{14}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$ or $\frac{\square}{\square}$

When you change eighths to higher terms, count by 8's to find the higher denominators.

When you change ninths to higher terms, count by ☐ 's to find the higher denominators.

When you change tenths to higher terms, count by ☐ 's to find the higher denominators.

When you change halves to higher terms, count by ☐ 's to find the higher denominators.

When you change thirds to higher terms, count by ☐ 's to find the higher denominators.

When you change fourths to higher terms, count by ☐ 's to find the higher denominators.

Common Denominator in Simply Related Fractions

Change $\frac{1}{2}$ and $\frac{3}{4}$ to fractions that have the same denominator. Counting by 2's, you get 2, 4, 6, 8, 10, 12, and so on.

Counting by 4's, you get 4, 8, 12, 16, 20, 24, and so on.

$\frac{1}{2}$ can be changed to fourths.

$\frac{3}{4}$ cannot be changed to halves.

Use 4 as the common denominator.

$\frac{1}{2}$ and $\frac{3}{4} = \frac{2}{4}$ and $\frac{3}{4}$

Change $\frac{1}{5}$ and $\frac{7}{10}$ to fractions that have the same denominator. 10 can be reached by counting by 5's. Use 10 as the common denominator.

$\frac{1}{5}$ and $\frac{7}{10} = \frac{\square}{10}$ and $\frac{7}{10}$

Change $\frac{1}{3}$ and $\frac{1}{6}$ to fractions that have the same denominator. 6 can be reached by counting by 3's. Use 6 as the common denominator.

$\frac{1}{3}$ and $\frac{1}{6} = \frac{\square}{6}$ and $\frac{1}{6}$

Change $\frac{1}{2}$ and $\frac{5}{8}$ to fractions that have the same denominator. 8 can be reached by counting by 2's. Use 8 as the common denominator.

$\frac{1}{2}$ and $\frac{5}{8} = \frac{\square}{8}$ and $\frac{5}{8}$

Change each pair of fractions into fractions that have the same denominator.

$\frac{1}{3}$	and	$\frac{2}{9}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{1}{4}$	and	$\frac{1}{12}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{1}{2}$	and	$\frac{3}{10}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{2}{3}$	and	$\frac{5}{12}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{1}{6}$	and	$\frac{1}{2}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{7}{10}$	and	$\frac{2}{5}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{4}{15}$	and	$\frac{1}{3}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{2}{15}$	and	$\frac{1}{5}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{1}{4}$	and	$\frac{1}{2}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{1}{2}$	and	$\frac{3}{8}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{3}{10}$	and	$\frac{1}{2}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{3}{4}$	and	$\frac{1}{8}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{1}{6}$	and	$\frac{1}{12}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	
$\frac{2}{7}$	and	$\frac{1}{14}$	=	$\frac{\square}{\square}$	and	$\frac{\square}{\square}$	

Addition of Unlike but Related Fractions

To add unlike fractions, first change them to fractions with a common denominator.

Examples

$$\begin{array}{r} \frac{1}{2} = \frac{2}{4} \\ +\ \frac{1}{4} = \frac{1}{4} \\ \hline \frac{3}{4} \end{array}$$

$$\begin{array}{r} \frac{2}{5} = \frac{4}{10} \\ +\ \frac{3}{10} = \frac{3}{10} \\ \hline \frac{7}{10} \end{array}$$

$\frac{2}{3} + \frac{5}{6} = \frac{4}{6} + \frac{5}{6} = \frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$

$\frac{4}{7} + \frac{1}{14} = \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square}$

$\frac{3}{5} + \frac{1}{10} = \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square}$

$\frac{5}{8} + \frac{3}{4} = \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square} = \square\frac{\square}{\square}$

$8\frac{1}{2} = 8\frac{\square}{\square}$

$+\ 5\frac{3}{4} = 5\frac{\square}{\square}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

Add.

$\frac{1}{5} = \frac{\square}{15}$

$+\ \frac{4}{15} = \frac{\square}{15}$

$\frac{\square}{15}$

$\frac{1}{3} = \frac{\square}{\square}$

$+\ \frac{1}{6} = \frac{\square}{\square}$

$\frac{\square}{\square} = \frac{\square}{\square}$

$7\frac{1}{2} = 7\frac{\square}{\square}$

$12\frac{3}{4} = 12\frac{\square}{\square}$

$+\ 5\frac{1}{4} = 5\frac{\square}{\square}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

$9\ \frac{1}{3}$

$+\ 4\ \frac{5}{6}$

$\frac{1}{4} + \frac{1}{8} = \frac{\square}{8} + \frac{1}{8} = \frac{\square}{8}$

$\frac{1}{9} + \frac{2}{3} = \frac{\square}{9} + \frac{\square}{9} = \frac{\square}{9}$

$8\ \frac{1}{2}$

$+\ 12\ \frac{3}{8}$

Subtraction of Unlike but Related Fractions

To subtract unlike fractions, first change them to fractions with a common denominator.

Examples

$$6\tfrac{3}{4} = \quad 6\tfrac{3}{4}$$
$$-\,2\tfrac{1}{2} = \quad -\,2\tfrac{2}{4}$$
$$\qquad\qquad\quad 4\tfrac{1}{4}$$

$$\tfrac{7}{10} - \tfrac{1}{5} = \tfrac{7}{10} - \tfrac{2}{10} = \tfrac{5}{10} = \tfrac{1}{2}$$

$$8\tfrac{1}{6} = \quad 8\tfrac{1}{6} = \quad 7\tfrac{7}{6}$$
$$-\,4\tfrac{1}{3} = \quad -\,4\tfrac{2}{6} = \quad -\,4\tfrac{2}{6}$$
$$\qquad\qquad\qquad\quad 3\tfrac{5}{6}$$

$$\tfrac{5}{6} - \tfrac{2}{3} = \frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square}$$

$$\tfrac{7}{12} - \tfrac{1}{3} = \frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

$$\tfrac{9}{10} - \tfrac{2}{5} = \frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

$$\tfrac{1}{6} - \tfrac{1}{18} = \frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

$$16\tfrac{1}{4} = \quad 16\tfrac{1}{4} = \quad 15\tfrac{\square}{4}$$
$$-\,5\tfrac{1}{2} = \quad -\,5\tfrac{\square}{4} = \quad -\,5\tfrac{\square}{4}$$
$$\qquad\qquad\qquad\quad \square\tfrac{\square}{4}$$

Subtract.

$$19\tfrac{1}{5} = \quad 19\tfrac{\square}{10}$$
$$-\,5\tfrac{1}{10} = \quad -\,5\tfrac{\square}{10}$$
$$\qquad\qquad\quad \square\tfrac{\square}{\square}$$

$$17\tfrac{5}{8}$$
$$-\,4\tfrac{1}{2}$$

$$21\tfrac{5}{8} = \quad \square\tfrac{\square}{\square}$$

$$-\,7\tfrac{1}{4} = \quad -\,\square\tfrac{\square}{\square}$$
$$\qquad\qquad\quad \square\tfrac{\square}{\square}$$

$$25\tfrac{2}{3}$$
$$-\,6\tfrac{1}{9}$$

$$\tfrac{5}{9} - \tfrac{1}{3} = \frac{\square}{9} - \frac{\square}{9} = \frac{\square}{9}$$

$$\tfrac{7}{8} - \tfrac{1}{4} = \frac{\square}{8} - \frac{\square}{8} = \frac{\square}{8}$$

$$32\tfrac{1}{12}$$
$$-\,5\tfrac{5}{6}$$

A Two-Digit Divisor and a Three-Digit Dividend

$$\begin{array}{r} 15 \\ \times\ 10 \\ \hline 150 \end{array} \qquad \begin{array}{r} 15 \\ \times\ 20 \\ \hline 300 \end{array}$$

$$\begin{array}{r} 15 \\ \times\ 30 \\ \hline 450 \end{array} \qquad \begin{array}{r} 15 \\ \times\ 40 \\ \hline 600 \end{array} \qquad \begin{array}{r} 15 \\ \times\ 50 \\ \hline 750 \end{array}$$

$$\begin{array}{r} 15 \\ \times\ 4 \\ \hline 60 \end{array} \qquad \begin{array}{r} 15 \\ \times\ 5 \\ \hline 75 \end{array} \qquad \begin{array}{r} 15 \\ \times\ 6 \\ \hline 90 \end{array}$$

$$\begin{array}{r} 6 \\ 40 \\ \hline 15 \overline{)\,690} \\ 600 \\ \hline 90 \\ 90 \\ \hline \end{array}$$

Answer: 46

Check.

$6 \times 15 =$

$40 \times 15 =$

$$\begin{array}{r} 15 \\ \times\ 46 \\ \hline 90 \\ 600 \\ \hline 690 \end{array}$$

$$\begin{array}{r} 23 \\ \times\ 10 \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ \times\ 20 \\ \hline \end{array}$$

$$\begin{array}{r} 23 \\ \times\ 30 \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ \times\ 40 \\ \hline \end{array}$$

$$\begin{array}{r} 23 \\ \times\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} \square \\ \square\square \\ \hline 23 \overline{)\,713} \\ \square\square\square \\ \hline \square\square \\ \square\square \\ \hline \end{array}$$

Answer:

Check.

$$\begin{array}{r} 17 \\ \times\ 10 \\ \hline \end{array} \qquad \begin{array}{r} 17 \\ \times\ 20 \\ \hline \end{array}$$

$$\begin{array}{r} 17 \\ \times\ 30 \\ \hline \end{array} \qquad \begin{array}{r} 17 \\ \times\ 40 \\ \hline \end{array}$$

$$\begin{array}{r} 17 \\ \times\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} \square \\ \square\square \\ \hline 17 \overline{)\,544} \\ \square\square\square \\ \hline \square\square \\ \square\square \\ \hline \end{array}$$

Answer:

Check.

$31 \overline{)\,744}$

Check.

A Two-Digit Divisor and a Three-Digit Dividend

Divide and check.

24	24
× 10	× 20
240	480
24	24
× 30	× 3
720	72

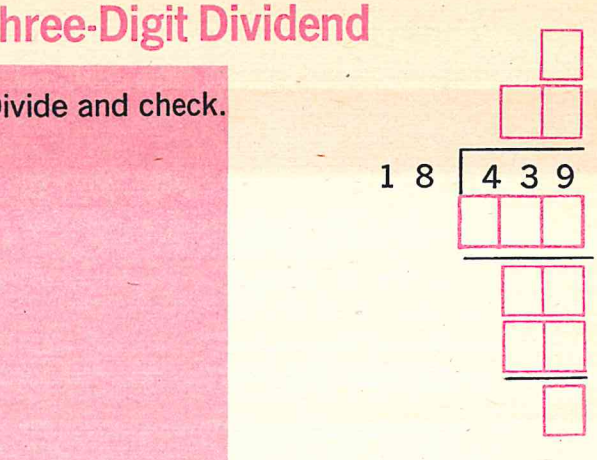
```
      3
     20
24 | 555
    480
     75
     72
      3
```

Answer: 23 and 3 left

Check.

24	552
× 23	+ 3
72	555
480	
552	

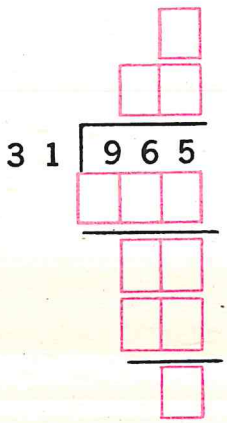
Divide and check.



Answer: ☐ and ☐ left

Check.

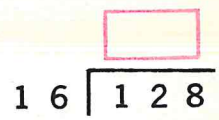
Divide and check.



Answer: ☐ and ☐ left

Check.

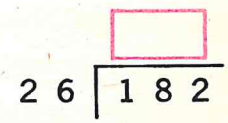
16
× 10
160 (too much)



Try numbers less than 10.

16	16
× 9	× 8
☐	☐

26
× 10
260 (too much)



Try numbers less than 10.

26	26	26
× 9	× 8	× 7
☐	☐	☐

A Two-Digit Divisor and a Four-Digit Dividend

$$\begin{array}{rr} 15 & 15 \\ \times\ 100 & \times\ 200 \\ \hline 1500 & 3000 \end{array}$$

$$\begin{array}{r} 15 \\ \times\ 300 \\ \hline 4500 \end{array}$$

$$\begin{array}{rr} 15 & 15 \\ \times\ 10 & \times\ 20 \\ \hline 150 & 300 \end{array}$$

$$\begin{array}{r} 15 \\ \times\ 3 \\ \hline 45 \end{array}$$

$$\begin{array}{r} 3 \\ 10 \\ 200 \\ \hline 15\overline{)3195} \\ 3000 \\ \hline 195 \\ 150 \\ \hline 45 \\ 45 \\ \hline \end{array}$$

Answer: 213

Check.

$$\begin{array}{r} 213 \\ \times\ 15 \\ \hline 1065 \\ 2130 \\ \hline 3195 \end{array}$$

15×213
$= 213 \times 15$
$= 3195$

$$\begin{array}{rr} 21 & 21 \\ \times\ 100 & \times\ 200 \\ \hline \square & \square \end{array}$$

$$\begin{array}{rr} 21 & 21 \\ \times\ 40 & \times\ 50 \\ \hline \square & \square \end{array}$$

$$\begin{array}{rr} 21 & 21 \\ \times\ 60 & \times\ 6 \\ \hline \square & \square \end{array}$$

$$\begin{array}{r} \square \\ \square\ \square \\ \square\ \square\ \square \\ \hline 21\overline{)3276} \\ \square\ \square\ \square\ \square \\ \hline \square\ \square\ \square\ \square \\ \square\ \square\ \square\ \square \\ \hline \square\ \square\ \square \\ \square\ \square\ \square \\ \hline \end{array}$$

Answer: $\square\ \square\ \square$

$$\begin{array}{rr} 16 & 16 \\ \times\ 100 & \times\ 200 \\ \hline \square & \square \end{array}$$

$$\begin{array}{rr} 16 & 16 \\ \times\ 300 & \times\ 400 \\ \hline \square & \square \end{array}$$

$$\begin{array}{rr} 16 & 16 \\ \times\ 10 & \times\ 20 \\ \hline \square & \square \end{array}$$

$$\begin{array}{r} \square\ \square \\ \square\ \square\ \square \\ 16\overline{)5120} \\ \square\ \square\ \square\ \square \\ \hline \square\ \square\ \square \\ \square\ \square\ \square \\ \hline \end{array}$$

Answer: $\square\ \square\ \square$

Check.

$$\begin{array}{rr} 24 & 24 \\ \times\ 100 & \times\ 200 \\ \hline \square & \square \end{array}$$

$$\begin{array}{rr} 24 & 24 \\ \times\ 300 & \times\ 400 \\ \hline \square & \square \end{array}$$

$$\begin{array}{r} 24 \\ \times\ 1 \\ \hline \square \end{array}$$

$$\begin{array}{r} \square \\ \square\ \square\ \square \\ 24\overline{)7224} \\ \square\ \square\ \square\ \square \\ \hline \square\ \square \\ \square\ \square \\ \hline \end{array}$$

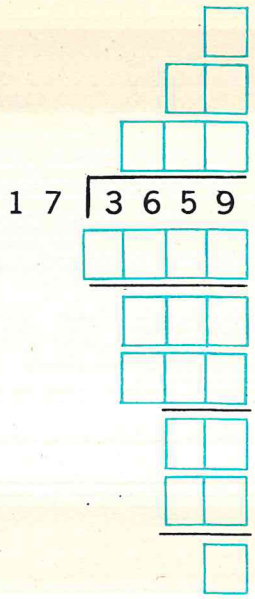
Answer: $\square\ \square\ \square$

Check.

A Two-Digit Divisor and a Four-Digit Dividend

17 × 100 =	17 × 200 =
17 × 300 =	17 × 10 =
17 × 20 =	17 × 5 =

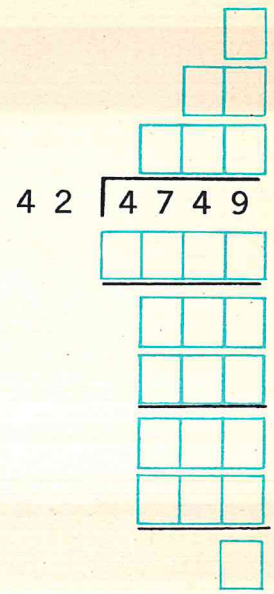
17 | 3659



Answer: ☐☐☐ and ☐ left

Check.

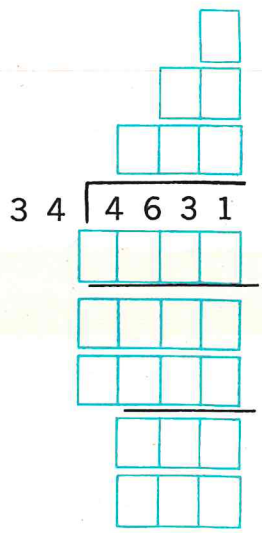
42 | 4749



Answer: ☐☐☐ and ☐ left

Check.

34 | 4631



Answer: ☐☐☐ and ☐ left

Check.

19 × 100 = 1900 (too much)

Try numbers less than 100.

19 × 90 = ☐

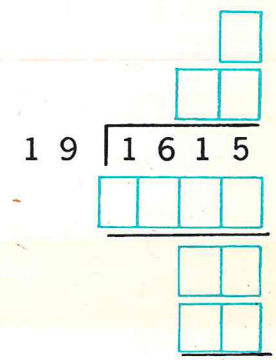
19 × 80 = ☐

19 × 4 = ☐

19 × 5 = ☐

Answer: ☐☐

19 | 1615



Check.

Review and Test

Change each pair of fractions into fractions that have a common denominator.

$\frac{2}{3}$ and $\frac{5}{6}$ = $\frac{\square}{\square}$ and $\frac{\square}{\square}$

$\frac{1}{2}$ and $\frac{1}{4}$ = $\frac{\square}{\square}$ and $\frac{\square}{\square}$

$\frac{2}{5}$ and $\frac{3}{10}$ = $\frac{\square}{\square}$ and $\frac{\square}{\square}$

Add.

$$\begin{array}{r} 6\ \frac{2}{8} \\ 5\ \frac{3}{8} \\ +\ 1\ \frac{1}{8} \\ \hline \end{array}$$

$\square\ \frac{\square}{\square}$

$= \square\ \frac{\square}{\square}$

Add.

$$\begin{array}{r} 8\ \frac{1}{10} \\ 4\ \frac{2}{10} \\ +\ 3\ \frac{5}{10} \\ \hline \end{array}$$

$\square\ \frac{\square}{\square}$

$= \square\ \frac{\square}{\square}$

Add.

$8\ \frac{1}{3} = \square\ \frac{\square}{\square}$

$+\ 2\ \frac{1}{6} = \square\ \frac{\square}{\square}$

$\square\ \frac{\square}{\square} = \square\ \frac{\square}{\square}$

Subtract.

$11\ \frac{1}{4} = \square\ \frac{\square}{4}$

$-\ 3\ \frac{3}{4} = -\ 3\ \frac{3}{4}$

$\square\ \frac{\square}{\square} = \square\ \frac{\square}{\square}$

Multiply.

$$\begin{array}{r} 146 \\ \times\ 28 \\ \hline \end{array}$$

$$\begin{array}{r} 42{,}065 \\ \times\ 37 \\ \hline \end{array}$$

Divide.

$15\overline{)120}$

Divide.

$21\overline{)527}$

Divide.

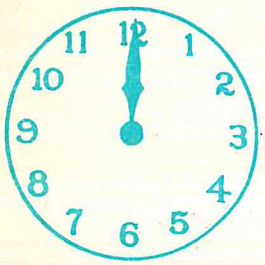
$36\overline{)5148}$

Units of Time

Abbreviations

da. = days **min.** = minutes

hr. = hours **sec.** = seconds



24 hr. = 1 day

60 min. = 1 hr.

60 sec. = 1 min.

---

24 × 2 = ☐	24 × 3 = ☐	24 × 4 = ☐	24 × 5 = ☐

2 da. = ☐ hr. 4 da. = ☐ hr.

3 da. = ☐ hr. 5 da. = ☐ hr.

$\frac{1}{2}$ hr. = $\frac{1}{2}$ of ☐ min. = ☐ min.

$\frac{1}{4}$ hr. = $\frac{1}{4}$ of ☐ min. = ☐ min.

$1\frac{1}{2}$ hr. = 60 min. + ☐ min. = ☐ min.

$1\frac{1}{4}$ hr. = 60 min. + ☐ min. = ☐ min.

---

70 min. = 1 hr. 10 min.

75 min. = 1 hr. ☐ min.

80 min. = 1 hr. ☐ min.

90 min. = ☐ hr. ☐ min.

60 × 2 = ☐	60 × 3 = ☐	60 × 4 = ☐	60 × 5 = ☐

120 min. = ☐ hr. 240 min. = ☐ hr.

180 min. = ☐ hr. 300 min. = ☐ hr.

---

36 hr. = 24 hr. + 12 hr. = ☐ $\frac{\square}{\square}$ da.

48 hr. = ☐ da. 72 hr. = ☐ da.

12 months = 1 year

mo. is the abbreviation for months.

15 mo. = 12 mo. + 3 mo. = 1 yr. 3 mo.

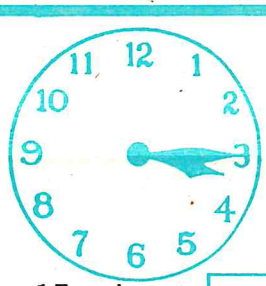
18 mo. = 12 mo. + ☐ mo.
= ☐ yr. ☐ mo.

14 mo. = 12 mo. + ☐ mo.
= ☐ yr. ☐ mo.

16 mo. = 12 mo. + ☐ mo.
= ☐ yr. ☐ mo.

24 mo. = ☐ yr. 36 mo. = ☐ yr.

48 mo. = ☐ yr. 60 mo. = ☐ yr.



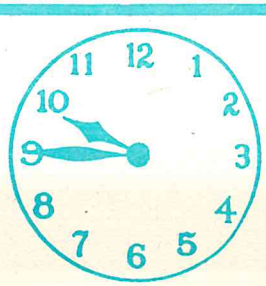
If it is 3:15 P.M. now, what time will it be in a half hour?

Think: $\frac{1}{2}$ hr. = ☐ min.

15 min. + ☐ min. = ☐ min. The time will be 3: ☐ P.M.

If it is 3:20 P.M. now, in how many minutes will it be 4:00 P.M.?

Think: There are ☐ min. in the hour between 3 P.M. and 4 P.M. 3:20 P.M. means 20 minutes have passed since 3 P.M. There are ☐ min. left in the hour.



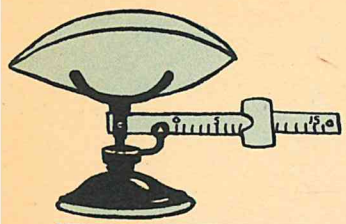
A lesson began at 9:45 A.M. and lasted half an hour. When did the lesson end?

Think: The lesson lasts 30 min. After the first 15 min. the time was ☐ A.M. After the next 15 min. the time was ☐ A.M.

Units of Weight

Abbreviations

oz. = ounces **lb.** = pounds



16 oz. = 1 lb.

2000 lb. = 1 ton

16 × 2	16 × 3	16 × 4	16 × 5

2 lb. = ☐ oz. 4 lb. = ☐ oz.

3 lb. = ☐ oz. 5 lb. = ☐ oz.

$\frac{1}{2}$ lb. = $\frac{1}{2}$ of ☐ oz. = ☐ oz.

$\frac{1}{4}$ lb. = $\frac{1}{4}$ of ☐ oz. = ☐ oz.

$1\frac{1}{2}$ lb. = 16 oz. + ☐ oz. = ☐ oz.

$1\frac{1}{4}$ lb. = 16 oz. + ☐ oz. = ☐ oz.

18 oz. = 16 oz. + 2 oz. = 1 lb. 2 oz.

20 oz. = 16 oz. + ☐ oz. = 1 lb. ☐ oz.

22 oz. = 16 oz. + ☐ oz. = 1 lb. ☐ oz.

36 oz. = 16 oz. + 16 oz. + ☐ oz.

= ☐ lb. ☐ oz.

33 oz. = 16 oz. + 16 oz. + ☐ oz.

= ☐ lb. ☐ oz.

35 oz. = 16 oz. + 16 oz. + ☐ oz.

= ☐ lb. ☐ oz.

50 oz. = ☐ oz. + 2 oz. = ☐ lb. 2 oz.

1 lb. 10 oz. = ☐ oz. 2 lb. 2 oz. = ☐ oz.

1 lb. 4 oz. = ☐ oz. 2 lb. 5 oz. = ☐ oz.

1 lb. 8 oz. = ☐ oz. 2 lb. 9 oz. = ☐ oz.

2000 × 2	2000 × 3	2000 × 4

2 tons = ☐ lb. 3 tons = ☐ lb.

4 tons = ☐ lb. 5 tons = ☐ lb.

6 tons = ☐ lb. 7 tons = ☐ lb.

$\frac{1}{2}$ of 2000 = ☐ $\frac{1}{2}$ ton = ☐ lb.

$\frac{1}{2}$ of 1000 = ☐ $\frac{1}{4}$ ton = ☐ lb.

$\frac{1}{2}$ of 500 = ☐ $\frac{1}{8}$ ton = ☐ lb.

4000 lb. = ☐ tons 8000 lb. = ☐ tons

6000 lb. = ☐ tons 14000 lb. = ☐ tons

10000 lb. = ☐ tons 12000 lb. = ☐ tons

3000 lb. = 2000 lb. + 1000 lb. = $1\frac{1}{2}$ tons

5000 lb. = ☐ lb. + 1000 lb. = ☐ $\frac{\square}{\square}$ tons

7000 lb. = ☐ $\frac{\square}{\square}$ tons

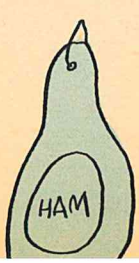
$1\frac{1}{4}$ tons = 2000 lb. + ☐ lb. = ☐ lb.

$2\frac{1}{4}$ tons = ☐ lb. + ☐ lb. = ☐ lb.

$1\frac{1}{2}$ tons = ☐ lb. + ☐ lb. = ☐ lb.

$2\frac{1}{2}$ tons = ☐ lb. + ☐ lb. = ☐ lb.

How many people will $1\frac{1}{4}$ lbs. of meat serve, if each serving is 5 oz.? Think: $1\frac{1}{4}$ lb. = ☐ oz. How many 5's are there in ☐ ?

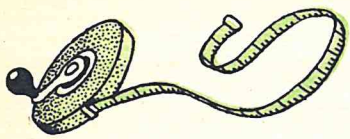


Answer: ☐

Units of Length

Abbreviations

in. = inches **ft.** = feet **yd.** = yards



12 in. = 1 ft.

3 ft. = 1 yd.

12 × 2 =	12 × 3 =	12 × 4 =	12 × 5 =

2 ft. = ☐ in. 4 ft. = ☐ in.

3 ft. = ☐ in. 5 ft. = ☐ in.

$\frac{1}{2}$ ft. = $\frac{1}{2}$ of ☐ in. = ☐ in.

$\frac{1}{4}$ ft. = $\frac{1}{4}$ of ☐ in. = ☐ in.

$1\frac{1}{2}$ ft. = 12 in. + ☐ in. = ☐ in.

$1\frac{1}{4}$ ft. = 12 in. + ☐ in. = ☐ in.

13 in. = 12 in. + 1 in. = 1 ft. 1 in.

14 in. = 12 in. + ☐ in. = 1 ft. ☐ in.

15 in. = ☐ ft. ☐ in. = ☐ ft.

16 in. = ☐ ft. ☐ in.

18 in. = ☐ ft. ☐ in. = ☐ ft.

26 in. = 12 in. + 12 in. + ☐ in.

= ☐ ft. ☐ in.

30 in. = 12 in. + 12 in. + ☐ in.

= ☐ ft. ☐ in.

1 ft. 5 in. = ☐ in. 2 ft. 1 in. = ☐ in.

1 ft. 4 in. = ☐ in. 2 ft. 3 in. = ☐ in.

2 ft. 4 in. = ☐ in. 2 ft. 6 in. = ☐ in.

3 ft. 1 in. = ☐ in. 3 ft. 2 in. = ☐ in.

4 ft. 2 in. = ☐ in. 5 ft. 2 in. = ☐ in.

1 yd. = 3 ft. = ☐ in.

36 × 2 =	36 × 3 =	36 × 4 =	36 × 5 =

2 yd. = ☐ in. 3 yd. = ☐ in.

4 yd. = ☐ in. 5 yd. = ☐ in.

4 ft. = 3 ft. + 1 ft. = 1 yd. 1 ft.

5 ft. = 3 ft. + ☐ ft.

= ☐ yd. ☐ ft.

6 ft. = 3 ft. + 3 ft. = 2 yd.

7 ft. = ☐ yd. ☐ ft. 10 ft. = ☐ yd. ☐ ft.

8 ft. = ☐ yd. ☐ ft. 11 ft. = ☐ yd. ☐ ft.

9 ft. = ☐ yd. 12 ft. = ☐ yd.

7 yd. 2 ft. = ☐ ft. 5 yd. 1 ft. = ☐ ft.

9 yd. 1 ft. = ☐ ft. 6 yd. 2 ft. = ☐ ft.

1 ft. = $\frac{1}{3}$ yd. 2 ft. = ☐ yd.

$1\frac{1}{3}$ yd. = 3 ft. + 1 ft. = 4 ft.

$1\frac{2}{3}$ yd. = 3 ft. + ☐ ft. = ☐ ft.

$2\frac{1}{3}$ yd. = ☐ ft. + 1 ft. = ☐ ft.

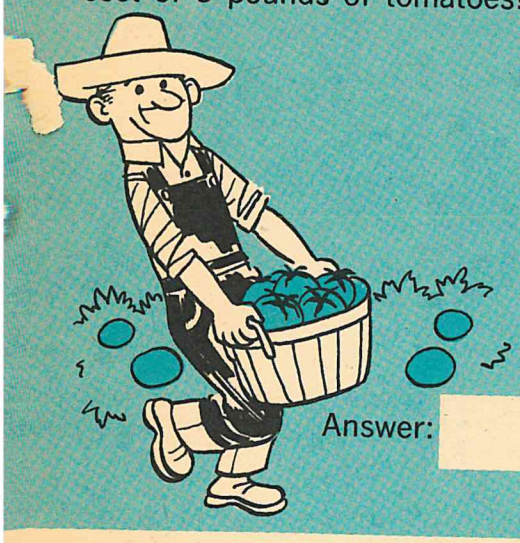
$2\frac{2}{3}$ yd. = ☐ ft. + ☐ ft. = ☐ ft.

5 yd. were cut from a piece of cloth that was 8 yd. long. How many yards were left?

Answer: ☐

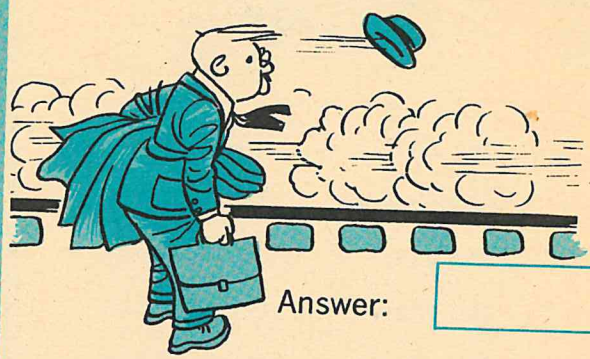
Problems about Rates

If tomatoes cost 17¢ per pound, what is the cost of 5 pounds of tomatoes?



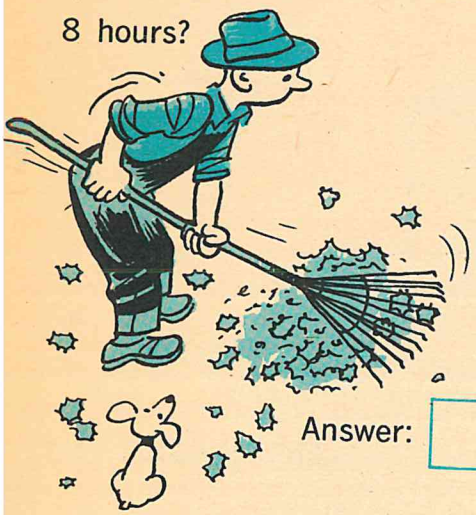
Answer:

If a train traveled 210 miles in 3 hours, how many miles did it go in one hour, on the average?



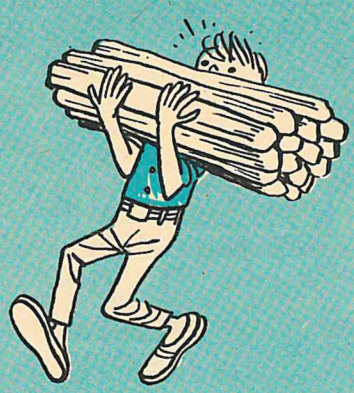
Answer:

Mr. Jones is paid $2.25 for each hour he works. How much will he be paid for working 8 hours?



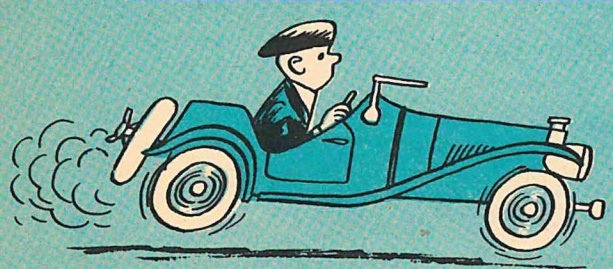
Answer:

Tom earned $972 in a period of 12 weeks. What were his average weekly earnings?



Answer:

If a car averages 45 miles an hour, how far will it travel in 6 hours?



Answer:

A jet plane traveled a distance of 2814 miles in 7 hours. What was its average speed per hour?

Answer:

Problems

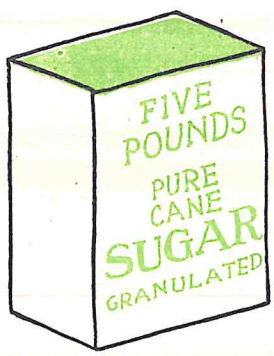
The table below shows how many miles Mr. Brown drove his car each year for 5 years. Find the total mileage.

1st year	11,010 miles
2nd year	9,876 miles
3rd year	10,150 miles
4th year	10,214 miles
5th year	9,965 miles
Total	

John weighed $112\frac{1}{4}$ lb. when the summer began. During the summer he gained $6\frac{1}{2}$ lb. How much did he weigh at the end of the summer?

Answer:

There were 5 lb. of sugar in a box. How many pounds were left after $1\frac{1}{2}$ lb. were used?

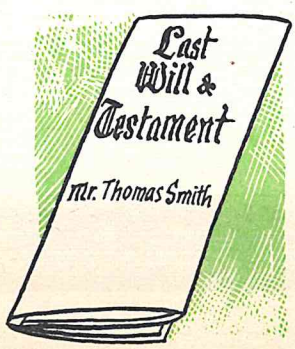


Answer:

Mr. Jones bought a tract of land for $6000. He used $4500 of his savings and borrowed the rest. How much money did he borrow?

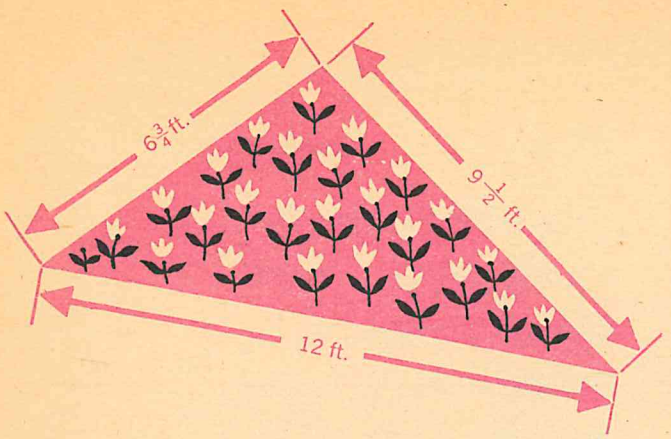
Answer:

Mr. Smith left an estate worth $17,125. It was shared equally by his 5 children. How much was the share of each?



Answer:

Perimeter



Mr. Smith has a triangular flower bed. The sides of the flower bed have the lengths shown in the picture. How many feet of fencing material are needed to make a fence around the flower bed? To find the answer, add the lengths of the three sides.

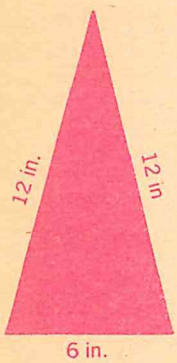
$6\frac{3}{4}$ ft. = $6\frac{3}{4}$ ft.

$9\frac{1}{2}$ ft. = $9\frac{\square}{4}$ ft.

$+\ 12$ ft. = 12 ft.

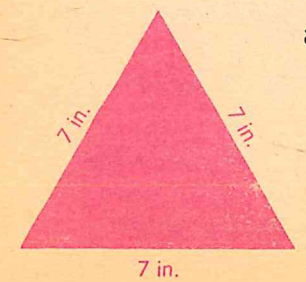
$\square\frac{\square}{4}$ ft.

$= \square\frac{\square}{4}$ ft.



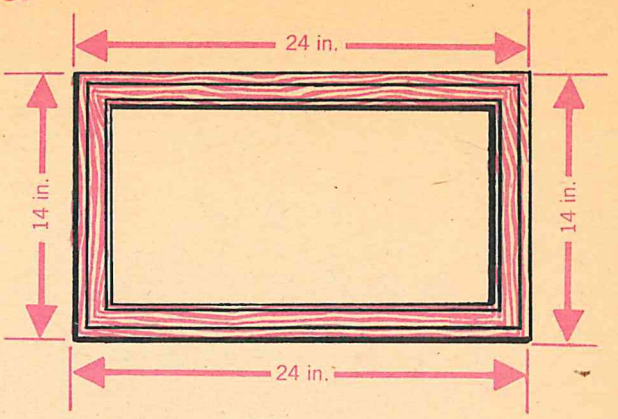
What is the distance around this triangle?

Answer:



What is the distance around this triangle?

Answer:

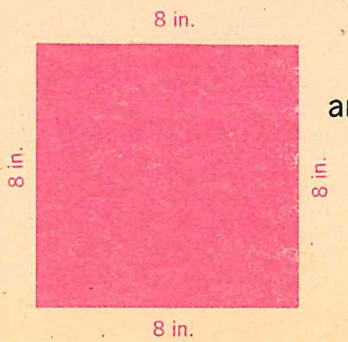


How many inches of picture-frame molding are needed to make the frame shown above?

Answer:

A park in a big city has the shape and dimensions shown in the drawing. There is a stone wall all around the park. How many miles long is the wall?

Answer:

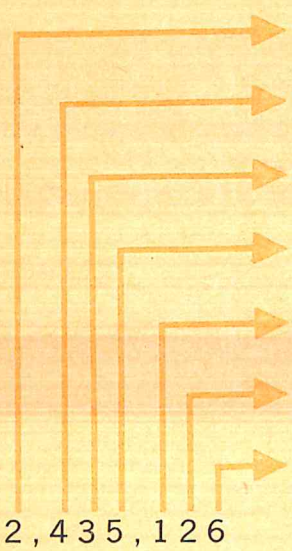


What is the distance around this square?

Answer:

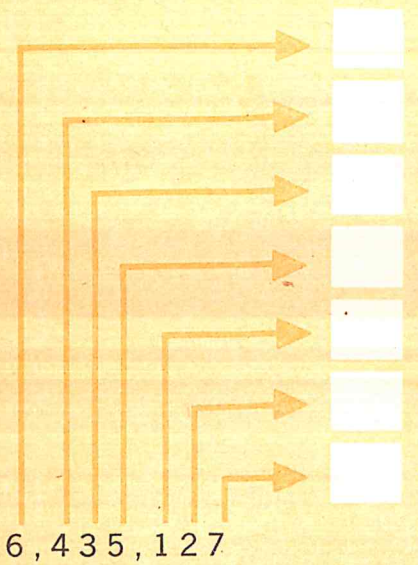
Seven-Digit Numerals

In a seven-digit numeral, the seventh digit from the right shows the number of millions.



In words: two million, four hundred thirty-five thousand, one hundred twenty-six.

Show the meaning of the numeral below, and write it in words.



In words: _____

10 hundred thousands = 1 million

$\frac{1}{2}$ million = ☐ hundred thousands

Underline the right word.

400,000 is (less more) than half a million.

600,000 is (less more) than half a million.

Round off to the nearest million.

3,120,569 is about ☐ million.

7,872,111 is about ☐ million.

8,486,299 is about ☐ million.

Write each number in numerals.

Four million, one hundred twenty-five thousand, six hundred eighteen.

☐,☐☐☐,☐☐☐

Three million, five hundred thousand.

☐,☐☐☐,☐☐☐

Two million four hundred ten.

☐,☐☐☐,☐☐☐

One million one.

☐,☐☐☐,☐☐☐

6 millions =

5 millions + ☐ hundred thousands.

9 millions + 3 hundred thousands =

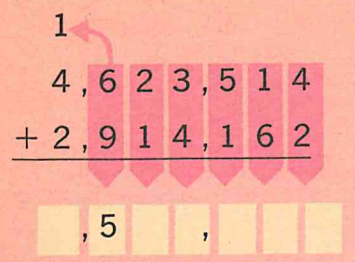
☐ millions + 13 hundred thousands.

7 millions + 5 hundred thousands =

6 millions + ☐ hundred thousands.

Adding Numbers Written as Seven-Digit Numerals

Example



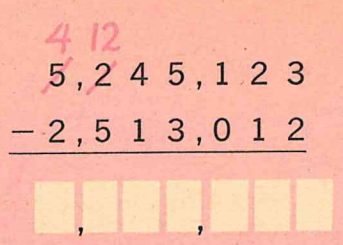
15 hundred thousands
= 1 million + 5 hundred thousands.

Add.

2,381,126 + 5,919,154	4,851,007 + 1,699,121
3,171,415 + 4,141,852	7,216,099 + 451,158
$41,625.49 + 15,415.25	$31,055.69 + 15,166.12
1,125,097 621,033 6,027 12 148,251	2,071,062 451,123 14 5,111 213,312

Subtracting Numbers Written as Seven-Digit Numerals

Example



5 millions + 2 hundred thousands
= 4 millions + 12 hundred thousands.

Subtract.

5,405,162 − 1,704,031	8,000,000 − 1,500,000

Subtract, and check by adding.

4,280,000
− 2,590,000

Check:

9,013,000
− 4,568,000

Check:

6,062,470
− 1,059,128

Check:

5,000,000
− 1

A Two-Digit Multiplier with a Four-Digit Multiplicand

Multiply.

3 1 4 6
× 1 5

The multiplier
15 = 10 + 5

Multiply by 5.

3 1 4 6
× 5

Step I

Multiply by 10.

3 1 4 6
× 1 0

Step II

Then add.

+

Step III

---

4 1 0 9
× 2 1

21 = 20 + 1

Multiply by 1.

4 1 0 9
× 1

Multiply by 20.

4 1 0 9
× 2 0

Then add.

+

---

5 6 1 9
× 4 2

Multiply by ☐.

Multiply by ☐.

Then add.

---

6 5 3 4
× 3 7

Multiply by ☐.

Multiply by ☐.

Then add.

---

2 1 6 5
× 5 1

Multiply by ☐.

Multiply by ☐.

Then add.

---

3 8 1 0
× 2 6

Multiply by ☐.

Multiply by ☐.

Then add.

A Two-Digit Multiplier with a Four-Digit Multiplicand, the Short Way

Arrange your work this way:

5 1 0 4
× 3 4

Step I—Multiply by 4. ☐☐☐☐☐

Step II—Multiply by 30. ☐☐☐☐☐☐

Step III—Add. ☐☐☐☐☐☐

2 1 7 8
× 1 6

Step I—Multiply by ☐ ☐☐☐☐☐

Step II—Multiply by ☐☐ ☐☐☐☐☐

Step III—Add. ☐☐☐☐☐

Multiply in the short way.

2 4 6 8 × 3 5	1 3 5 7 × 2 4	4 5 8 1 × 5 3	2 1 0 4 × 1 7
5 2 4 5 × 1 5	1 7 2 8 × 1 2	4 4 0 9 × 1 8	3 1 3 7 × 3 6

Write as a mixed number in lowest terms.

$\frac{12}{8}$ = ☐ $\frac{☐}{☐}$ = ☐ $\frac{☐}{☐}$

$\frac{12}{5}$ = ☐ $\frac{☐}{☐}$

$\frac{10}{3}$ = ☐ $\frac{☐}{☐}$

$\frac{7}{4}$ = ☐ $\frac{☐}{☐}$

$\frac{5}{2}$ = ☐ $\frac{☐}{☐}$

Change to fractions with a common denominator.

$\frac{1}{8}$ and $\frac{3}{4}$ = $\frac{☐}{☐}$ and $\frac{☐}{☐}$

$\frac{2}{5}$ and $\frac{3}{10}$ = $\frac{☐}{☐}$ and $\frac{☐}{☐}$

$\frac{1}{3}$ and $\frac{5}{6}$ = $\frac{☐}{☐}$ and $\frac{☐}{☐}$

$\frac{1}{2}$ and $\frac{1}{4}$ = $\frac{☐}{☐}$ and $\frac{☐}{☐}$

$\frac{1}{2}$ and $\frac{1}{10}$ = $\frac{☐}{☐}$ and $\frac{☐}{☐}$

Subtract.

15 = 14 $\frac{☐}{4}$

$-\ 2\frac{1}{4} = -\ 2\frac{1}{4}$

☐ $\frac{☐}{4}$

21 = ☐ $\frac{☐}{8}$

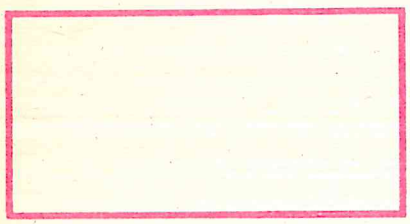
$-\ 3\frac{1}{8} = -\ 3\frac{1}{8}$

☐ $\frac{☐}{8}$

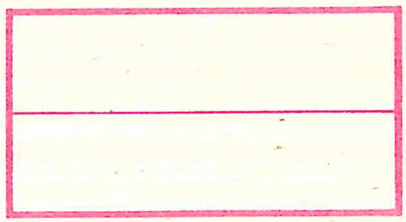
Common Denominator in Unrelated Fractions

Change $\frac{1}{2}$ and $\frac{1}{3}$ to fractions with a common denominator.

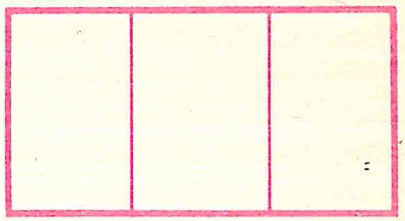
Step I Draw a rectangle to stand for 1.



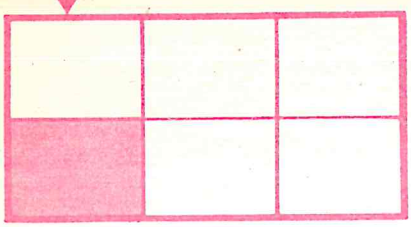
Step II Divide it into halves.



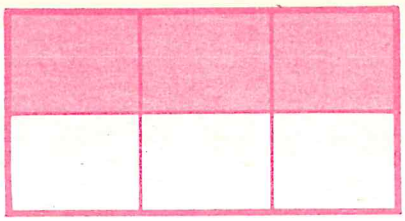
Step III Divide it into thirds.



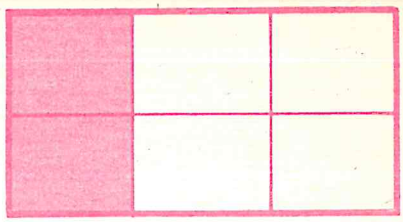
Then the rectangle has been divided into sixths.



Each part = $\frac{1}{6}$

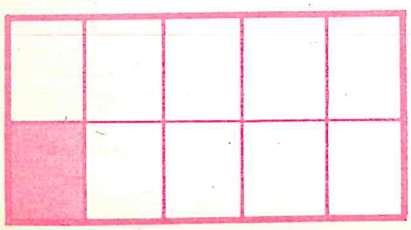


$\frac{1}{2} = \frac{3}{6}$

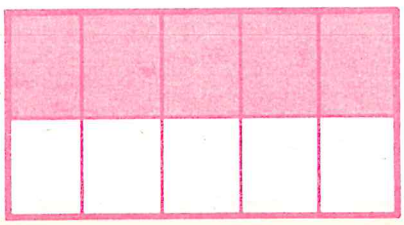


$\frac{1}{3} = \frac{2}{6}$

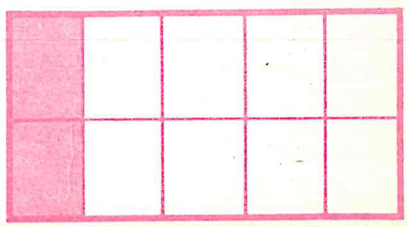
To change $\frac{1}{2}$ and $\frac{1}{5}$ to fractions with a common denominator, divide the rectangle into halves and fifths.



Each part = $\frac{1}{\square}$

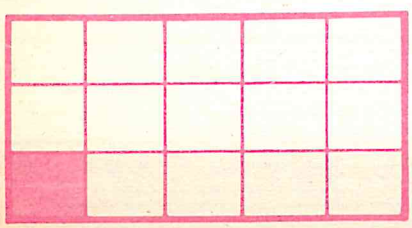


$\frac{1}{2} = \frac{\square}{\square}$

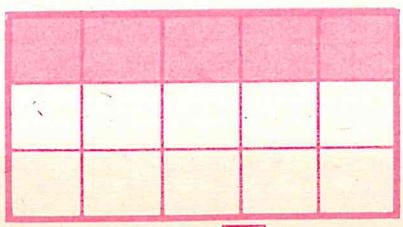


$\frac{1}{5} = \frac{\square}{\square}$

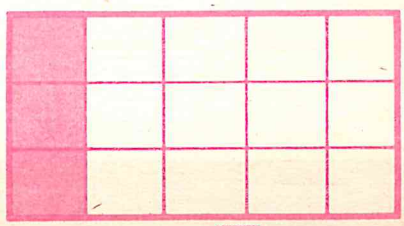
To change $\frac{1}{3}$ and $\frac{1}{5}$ to fractions with a common denominator, divide the rectangle into thirds and fifths.



Each part = $\frac{1}{\square}$



$\frac{1}{3} = \frac{\square}{\square}$



$\frac{1}{5} = \frac{\square}{\square}$

Lowest Common Denominator in Unrelated Fractions

Change $\frac{1}{6}$ and $\frac{1}{4}$ to fractions with a common denominator.

Here is how we find the lowest common denominator. $\frac{1}{6}$ may be changed to fractions with denominators 6, 12, 18, 24, . . . (count by sixes).

$\frac{1}{4}$ may be changed to fractions with denominators 4, 8, 12, 16, 20, . . . (count by fours).

The lowest common denominator is 12.

$\frac{1}{6} = \frac{\square}{12}$ $\frac{1}{4} = \frac{\square}{12}$

Change $\frac{1}{8}$ and $\frac{1}{6}$ to fractions with a common denominator.

Count by eights: 8, $\square$, $\square$, $\square$, . . .

Count by sixes: 6, $\square$, $\square$, $\square$, . . .

The lowest common denominator is $\square$

$\frac{1}{8} = \frac{\square}{\square}$ $\frac{1}{6} = \frac{\square}{\square}$

Change $\frac{1}{5}$ and $\frac{1}{4}$ to fractions with a common denominator.

Count by fives: 5, $\square$, $\square$, $\square$, $\square$, . . .

Count by fours: 4, $\square$, $\square$, $\square$, $\square$, . . .

The lowest common denominator is $\square$

$\frac{1}{5} = \frac{\square}{\square}$ $\frac{1}{4} = \frac{\square}{\square}$

Change each pair of fractions to fractions with a common denominator.

$\frac{1}{10}$ and $\frac{1}{6}$

Count by tens: 10, $\square$, $\square$, $\square$, $\square$, . . .

Count by sixes: 6, $\square$, $\square$, $\square$, $\square$, . . .

The lowest common denominator is $\square$.

$\frac{1}{10} = \frac{\square}{\square}$ $\frac{1}{6} = \frac{\square}{\square}$

$\frac{3}{4}$ and $\frac{7}{10}$

Count by fours: 4, $\square$, $\square$, $\square$, $\square$, . . .

Count by tens: 10, $\square$, $\square$, $\square$, $\square$, . . .

The lowest common denominator is $\square$.

$\frac{3}{4} = \frac{\square}{\square}$ $\frac{7}{10} = \frac{\square}{\square}$

$\frac{5}{6}$ and $\frac{2}{9}$

Count by sixes: 6, $\square$, $\square$, $\square$, $\square$, . . .

Count by nines: 9, $\square$, $\square$, $\square$, $\square$, . . .

The lowest common denominator is $\square$.

$\frac{5}{6} = \frac{\square}{\square}$ $\frac{2}{9} = \frac{\square}{\square}$

$\frac{2}{7}$ and $\frac{3}{5}$

Count by sevens: 7, $\square$, $\square$, $\square$, $\square$, $\square$, $\square$, $\square$, . . .

Count by fives: 5, $\square$, $\square$, $\square$, $\square$, $\square$, $\square$, $\square$, . . .

The lowest common denominator is $\square$.

$\frac{2}{7} = \frac{\square}{\square}$ $\frac{3}{5} = \frac{\square}{\square}$

Lowest Common Denominator in Unrelated Fractions

Change $\frac{1}{6}, \frac{1}{4}$, and $\frac{1}{3}$ to fractions with the lowest common denominator.

Step I. Pick out the largest denominator from among 6, 4, and 3. It is 6.

Step II. Count by sixes: 6, 12, 18, 24, 30, 36, 42.

Step III. Stop at the first number that is a common denominator for 4 and 3. It is 12.

$\frac{1}{6} = \frac{\quad}{12}$ $\frac{1}{4} = \frac{\quad}{12}$ $\frac{1}{3} = \frac{\quad}{12}$

Change each set of fractions to fractions with a common denominator.

$\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

4 is the highest denominator. Count by fours:

4 ____ ____ ____ ____ ____ ____ ____

The lowest common denominator is ____

$\frac{1}{4} = \frac{\quad}{\quad}$ $\frac{1}{3} = \frac{\quad}{\quad}$ $\frac{1}{2} = \frac{\quad}{\quad}$

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{1}{5}$

5 is the highest denominator. Count by fives:

5 ____ ____ ____ ____ ____ ____ ____

The lowest common denominator is ____

$\frac{1}{2} = \frac{\quad}{\quad}$ $\frac{2}{3} = \frac{\quad}{\quad}$ $\frac{1}{5} = \frac{\quad}{\quad}$

$\frac{2}{5}$ $\frac{3}{4}$ $\frac{1}{2}$

Count by 5's:

5 ____ ____ ____ ____ ____ ____ ____

The lowest common denominator is ____

$\frac{2}{5} = \frac{\quad}{\quad}$ $\frac{3}{4} = \frac{\quad}{\quad}$ $\frac{1}{2} = \frac{\quad}{\quad}$

$\frac{2}{3}$ $\frac{5}{8}$ $\frac{1}{6}$

Count by ____'s:

____ ____ ____ ____ ____ ____ ____

The lowest common denominator is ____

$\frac{2}{3} = \frac{\quad}{\quad}$ $\frac{5}{8} = \frac{\quad}{\quad}$ $\frac{1}{6} = \frac{\quad}{\quad}$

$\frac{1}{4}$ $\frac{1}{6}$

Count by ____'s:

____ ____ ____ ____ ____ ____ ____

The lowest common denominator is ____

$\frac{1}{4} = \frac{\quad}{\quad}$ $\frac{1}{6} = \frac{\quad}{\quad}$

$\frac{1}{8}$ $\frac{1}{3}$

Count by ____'s:

____ ____ ____ ____ ____ ____ ____

The lowest common denominator is ____

$\frac{1}{8} = \frac{\quad}{\quad}$ $\frac{1}{3} = \frac{\quad}{\quad}$

$\frac{1}{7}$ $\frac{3}{5}$

Count by ____'s:

____ ____ ____ ____ ____ ____ ____

The lowest common denominator is ____

$\frac{1}{7} = \frac{\quad}{\quad}$ $\frac{3}{5} = \frac{\quad}{\quad}$

Addition of Unrelated Fractions

$5\frac{1}{3} = 5\frac{\square}{6}$

$+\ 2\frac{1}{2} = 2\frac{\square}{6}$

$\square\frac{\square}{6}$

Count by 3's.

$21\frac{1}{3}$

$+\ 16\frac{2}{5}$

$8\frac{5}{6} = \square\frac{\square}{12}$

$+\ 3\frac{1}{4} = \square\frac{\square}{12}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

Count by 6's.

$10\frac{1}{4}$

$+\ 5\frac{3}{5}$

$6\frac{1}{2} = \square\frac{\square}{\square}$

$5\frac{1}{3} = \square\frac{\square}{\square}$

$+\ 9\frac{1}{4} = \square\frac{\square}{\square}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

Count by 4's.

$9\frac{5}{6}$

$+\ 2\frac{1}{5}$

$10\frac{1}{2} = \square\frac{\square}{\square}$

$+\ 8\frac{2}{5} = \square\frac{\square}{\square}$

$\square\frac{\square}{\square}$

Count by ☐'s.

$5\frac{1}{3}$

$+\ 2\frac{1}{4}$

$12\frac{1}{4} = \square\frac{\square}{\square}$

$+\ 3\frac{5}{6} = \square\frac{\square}{\square}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

Count by ☐'s.

$8\frac{1}{4}$

$5\frac{1}{2}$

$+\ 10\frac{1}{6}$

$3\frac{1}{2}$

$+\ 2\frac{1}{7}$

Subtraction of Unrelated Fractions

$16\frac{1}{2} = \quad 16\frac{\square}{6}$

$-\ 5\frac{1}{3} = \quad -\ 5\frac{\square}{6}$

$\frac{\square}{6}$

$25\frac{1}{3} = \quad 25\frac{2}{6} = \quad 24\frac{\square}{6}$

$-\ 6\frac{1}{2} = \quad -\ 6\frac{3}{6} = \quad -\ 6\frac{3}{6}$

$\frac{\square}{6}$

$21\frac{3}{4} = \quad 21\frac{\square}{\square}$

$-\ 15\frac{1}{5} = \quad -\ 15\frac{\square}{\square}$

$\frac{\square}{\square}$

$20\frac{1}{4}$

$-\ 5\frac{1}{3}$

$17\frac{5}{8}$

$-\ 6\frac{1}{3}$

$30\frac{1}{5}$

$-\ 12\frac{1}{4}$

$24\frac{1}{4}$

$-\ 9\frac{1}{6}$

$70\frac{1}{5}$

$-\ 6\frac{1}{3}$

$42\frac{1}{2}$

$-\ 11\frac{1}{7}$

$80\frac{2}{5}$

$-\ 9\frac{1}{2}$

$5\frac{5}{6}$

$-\ 1\frac{3}{8}$

$75\frac{1}{6}$

$-\ 4\frac{3}{4}$

$19\frac{2}{3}$

$-\ 6\frac{1}{5}$

$20\frac{3}{10}$

$-\ 5\frac{3}{4}$

Multiplying by 1000

$1000 \times 23 = 23 \times 1000 = 23$ thousands
$= 20$ thousands $+ 3$ thousands
$= 2$ ten thousands $+ 3$ thousands
$= 23{,}000.$

	Ten Thousands	Thousands	Hundreds	Tens	Ones
1000 ×				2	3
=	2	3	0	0	0

Multiplying a number by 1000 moves each digit three places to the left, and zeros hold the places for ones, tens, and hundreds.

1000 × 64 =

1000 × 72 =

1000 × 49 =

1000 × 15 =

Multiplying by Multiples of 1000

$3000 \times 4 = 3 \times (1000 \times 4)$
$= 3 \times 4000 = 12{,}000.$

Multiplying by 3000 is like multiplying first by 1000, and then by 3.

```
   4
×3 0 0 0
1 2 0 0 0
```

To multiply by 3000, first put down 3 zeros and move left 3 places. This is like multiplying by 1000.

Then multiply by 3.

```
   2
×4 0 0 0
```

Put down 3 zeros.

Move ☐ places left, and multiply by 4.

```
  1 2
×5 0 0 0
```

Put down 3 zeros.

Move ☐ places left, and multiply by ☐

```
  1 3
×4 0 0 0
```

```
  2 1
×2 0 0 0
```

```
  1 6
×3 0 0 0
```

```
  2 5
×3 0 0 0
```

5000 × 7 = ☐☐☐☐☐

A Two-Digit Divisor and a Five-Digit Dividend

16 × 3000 = 48000

16 × 4000 = 64000

16 × 200 = 3200

16 × 300 = 4800

16 × 40 = 640

```
      1
     40
    200
   3000
16 | 51856
   48000
    3856
    3200
     656
     640
      16
      16
```

Answer: 3241

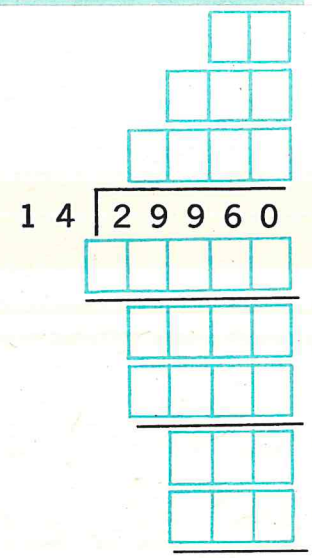
Check. 3241 × 16

14 × 2000 = ☐

14 × 3000 = ☐

14 × 100 = ☐

14 × 40 = ☐

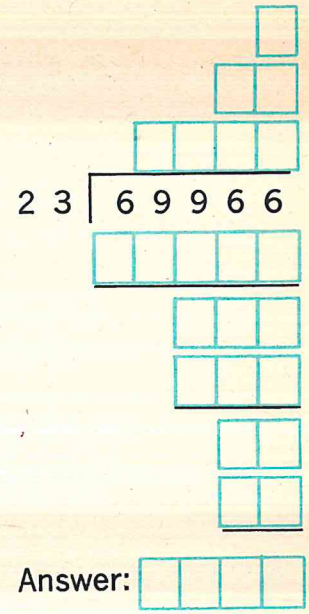


Answer: ☐☐☐☐

23 × 3000 = ☐

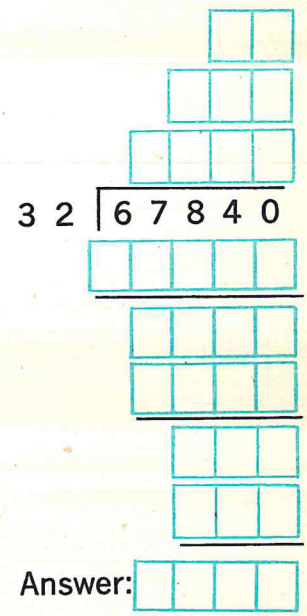
23 × 40 = ☐

23 × 2 = ☐



Answer: ☐☐☐

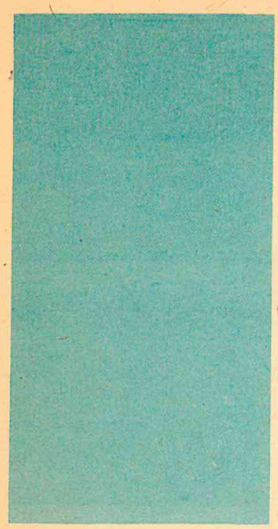
Check.

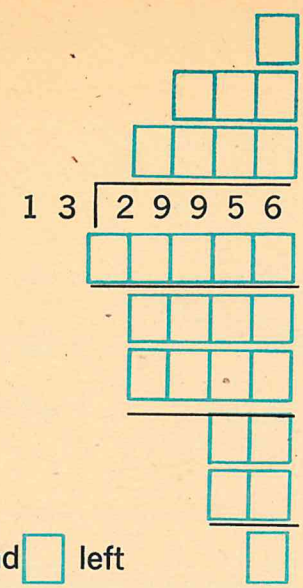


Answer: ☐☐☐☐

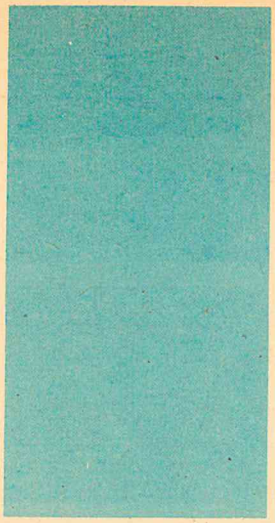
Check.

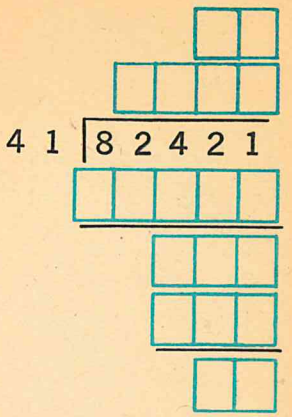
A Two-Digit Divisor and a Five-Digit Dividend





Answer: ☐☐☐☐ and ☐ left

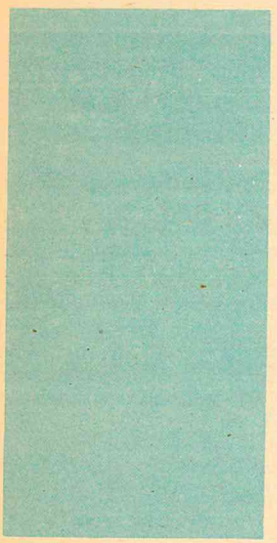


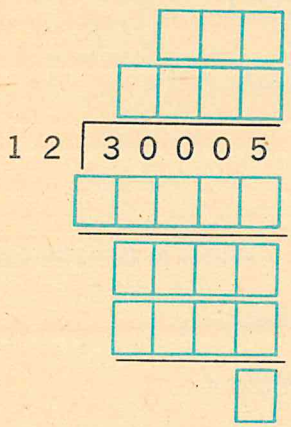


Answer: ☐☐☐☐ and ☐☐ left

Check.

Check.





Answer: ☐☐☐☐ and ☐ left

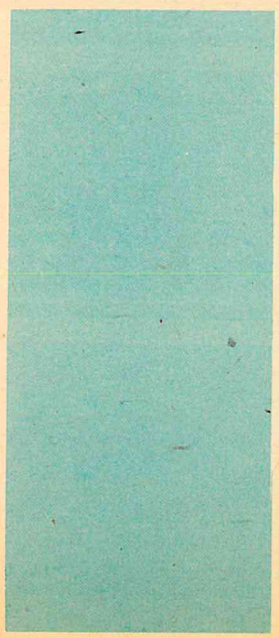
Check.

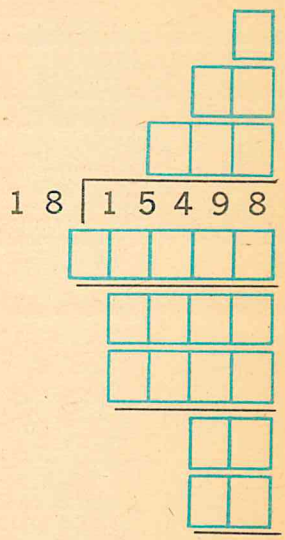
18

× 1000

18000 (too much)

Try numbers less than 1000.





Check.

Answer: ☐☐☐

Divide and check.

28 ⟌ 25592

Answer:

Check.

19 ⟌ 13676

Answer:

Check.

D = 500 C = 100

DC = 500 + ☐ = ☐

CD = 500 − ☐ = ☐

DL = ☐ + 50 = ☐

DCL = ☐ + 50 = ☐

CDL = ☐ + 50 = ☐

Write in Arabic numerals.

CDLX	= ☐	CDLV	= ☐
CDX	= ☐	CDXX	= ☐
CDXL	= ☐	CDLX	= ☐
CDXV	= ☐	CDXXV	= ☐
DLX	= ☐	DXL	= ☐
DLXX	= ☐	DLXV	= ☐
DCLX	= ☐	DCXL	= ☐
DCXXX	= ☐	DII	= ☐

Write in Roman numerals.

500	= ☐	400	= ☐
600	= ☐	501	= ☐
605	= ☐	404	= ☐
510	= ☐	520	= ☐
590	= ☐	490	= ☐
440	= ☐	445	= ☐
451	= ☐	552	= ☐
430	= ☐	570	= ☐
518	= ☐	615	= ☐
630	= ☐	499	= ☐

Review and Test

Add.

$$\begin{array}{r} 4{,}251{,}625 \\ +\ 1{,}352{,}119 \\ \hline \end{array} \qquad \begin{array}{r} 6{,}892{,}417 \\ +\ \ 123{,}801 \\ \hline \end{array}$$

Subtract and check.

$$\begin{array}{r} 5{,}100{,}219 \\ -\ 1{,}455{,}107 \\ \hline \end{array}$$

Multiply.

$$\begin{array}{r} 6412 \\ \times\ 29 \\ \hline \end{array} \qquad \begin{array}{r} 5701 \\ \times\ 42 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ \times\ 2000 \\ \hline \end{array} \qquad \begin{array}{r} 15 \\ \times\ 4000 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times\ 3000 \\ \hline \end{array} \qquad \begin{array}{r} 36 \\ \times\ 8000 \\ \hline \end{array}$$

Write in Arabic numerals.

DXV = ☐ CDL = ☐

DCCX = ☐ DLXI = ☐

Write in Roman numerals.

520 = ☐ 419 = ☐

604 = ☐ 559 = ☐

Add.

$8\frac{1}{3} = 8\frac{\square}{\square}$

$+\ 2\frac{1}{5} = 2\frac{\square}{\square}$

$\square\ \frac{\square}{\square}$

$12\frac{5}{6} = 12\frac{\square}{\square}$

$+\ 4\frac{3}{4} = 4\frac{\square}{\square}$

$\square\frac{\square}{\square} = \square\frac{\square}{\square}$

Subtract.

$$\begin{array}{r} 25\frac{1}{2} \\ -\ 4\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 19\frac{1}{4} \\ -\ 5\frac{4}{5} \\ \hline \end{array}$$

Divide and check.

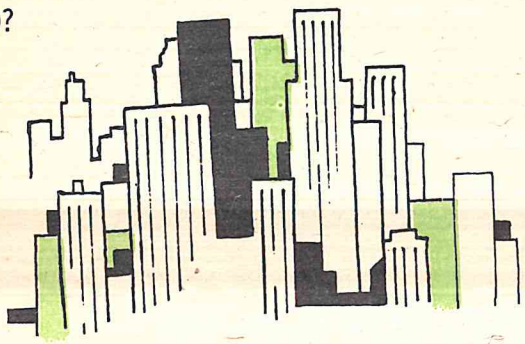
$34\overline{)15300}$

Answer: ☐

Check.

Problems

In 1940, the population of New York City was 7,454,995. In 1950, the population was 7,795,471. By how much did the population of New York City increase between 1940 and 1950?

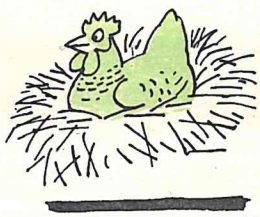


Answer:

Mrs. Jones is planning to use the same fabric for a skirt and for a dress. She needs $1\frac{1}{2}$ yd. for the skirt, and $3\frac{1}{3}$ yd. for the dress. How many yards should she buy?

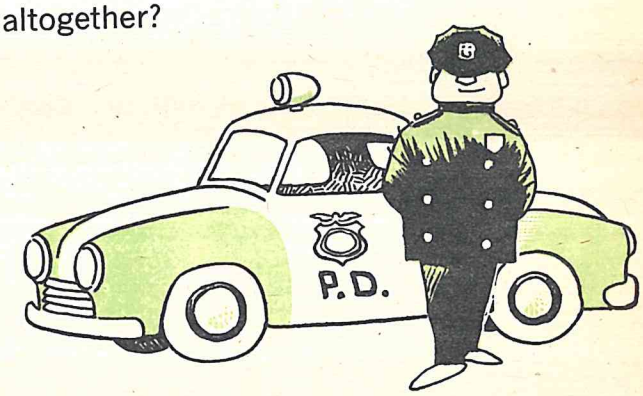
Answer:

A farmer packed 3780 eggs into boxes that hold a dozen each. How many boxes did he fill?



Answer:

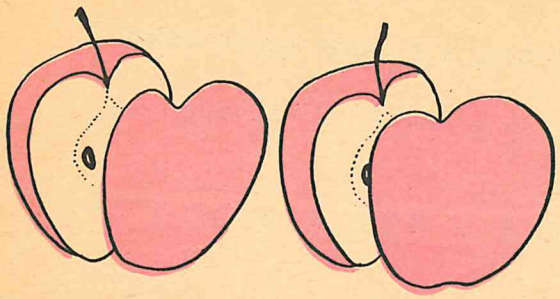
Gotham City bought 16 police cars that cost $2419 each. How much did the 16 cars cost altogether?



Answer:

A Whole Number Times a Unit Fraction

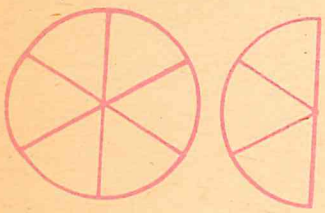
Each of four children is given $\frac{1}{2}$ of an apple. How many apples are used?



The number of apples used is

$4 \times \frac{1}{2} = 4$ halves $= \frac{4}{2} = 2$.

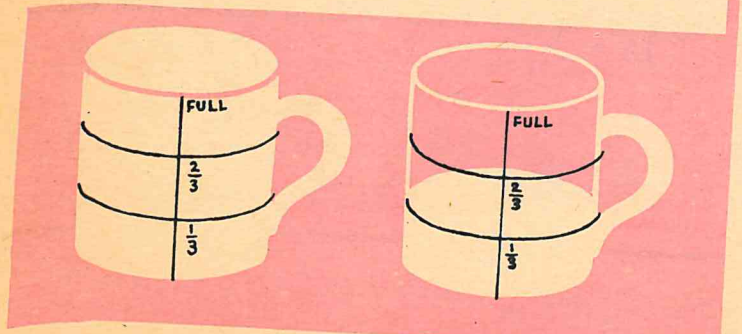
Each slice of pie is $\frac{1}{6}$ of a pie. If 9 children are served, how many pies are used?



The number of pies used is

$9 \times \frac{1}{6} = 9$ sixths $= \frac{9}{6} = 1\frac{1}{2}$.

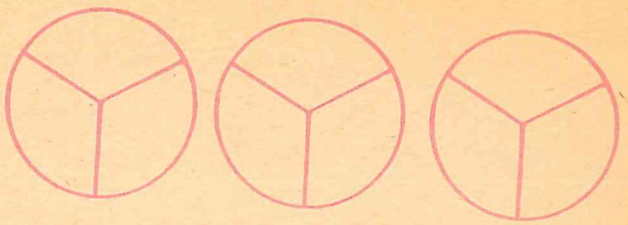
A recipe called for $\frac{1}{3}$ of a cup of sugar. How much sugar was needed for 4 times the recipe?



The number of cups of sugar is

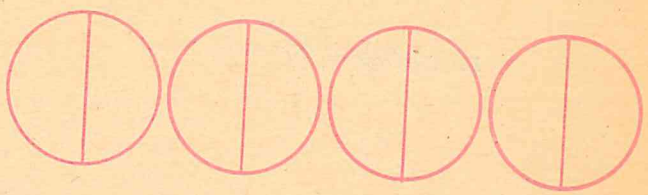
$4 \times \frac{1}{3} = 4$ thirds $= \frac{4}{3} = 1\frac{1}{3}$.

To find $6 \times \frac{1}{3}$, fill in 6 thirds.



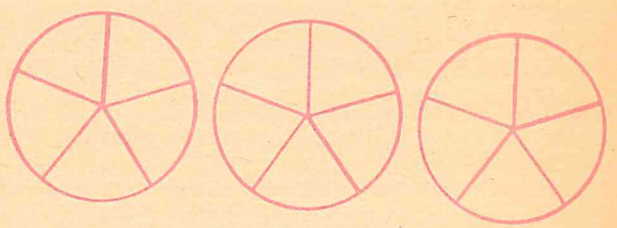
$6 \times \frac{1}{3} = \frac{6}{3} = \square$

To find $7 \times \frac{1}{2}$, fill in $\square$ halves.



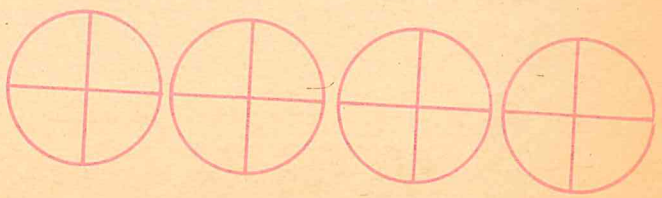
$7 \times \frac{1}{2} = \frac{\square}{\square} = \square\frac{\square}{\square}$

To find $10 \times \frac{1}{5}$, fill in $\square$ fifths.



$10 \times \frac{1}{5} = \frac{\square}{\square} = \square$

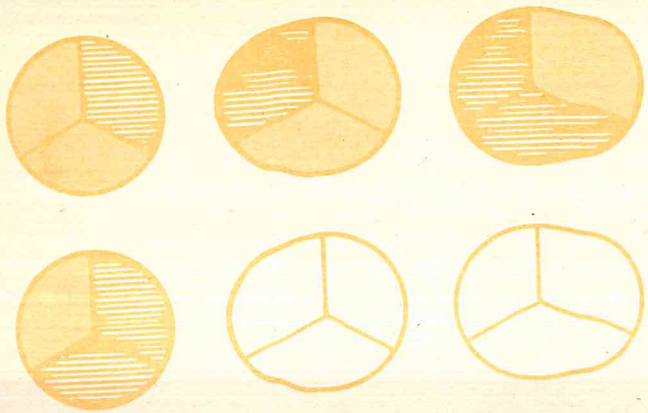
To find $9 \times \frac{1}{4}$, fill in $\square$ fourths.



$9 \times \frac{1}{4} = \frac{\square}{\square} = \square\frac{\square}{\square}$

A Whole Number Times a Fraction

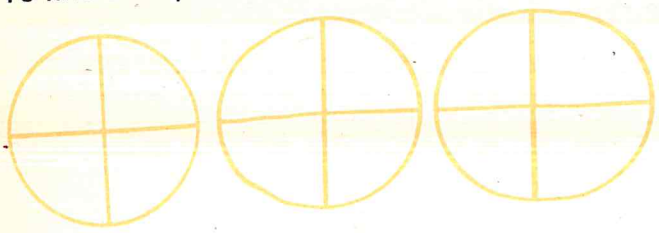
To find $6 \times \frac{2}{3}$, fill in 6 sets of 2 thirds each.



$6 \times \frac{2}{3} = (6 \times 2)$ thirds

$= 12$ thirds $= \frac{12}{3} = 4$

To find $2 \times \frac{3}{4}$, fill in 2 sets of 3 fourths each.



$2 \times \frac{3}{4} = \square$ fourths

$= \frac{\square}{4} = \frac{\square}{\square} = \frac{\square}{\square}$

To find $4 \times \frac{2}{5}$, fill in 4 sets of 2 fifths each.

$4 \times \frac{2}{5} = \square$ fifths

$= \frac{\square}{5} = \frac{\square}{\square}$

To multiply a fraction by a whole number, multiply the numerator by the whole number, and keep the same denominator.

$6 \times \frac{2}{3} = \frac{6 \times 2}{3} = \frac{12}{3} = 4$

$5 \times \frac{3}{2} = \frac{5 \times 3}{2} = \frac{\square}{2} = \square\frac{\square}{\square}$

$9 \times \frac{3}{4} = \frac{9 \times 3}{4} = \frac{\square}{4} = \square\frac{\square}{\square}$

$8 \times \frac{2}{5} = \frac{\square \times 2}{5} = \frac{\square}{5} = \square\frac{\square}{\square}$

Multiply.

$5 \times \frac{3}{10} =$

$6 \times \frac{2}{5} =$

$9 \times \frac{2}{3} =$

$12 \times \frac{1}{6} =$

$8 \times \frac{4}{9} =$

$20 \times \frac{1}{10} =$

$12 \times \frac{3}{10} =$

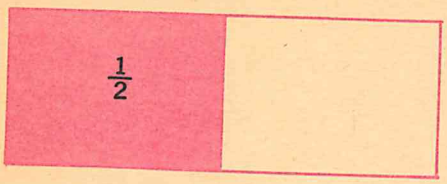
$9 \times \frac{1}{7} =$

$15 \times \frac{1}{2} =$

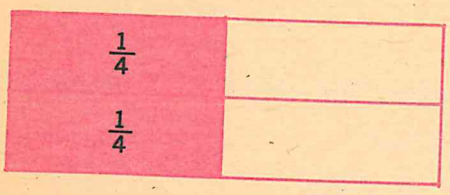
$8 \times \frac{3}{5} =$

A Unit Fraction Divided by a Whole Number

$\frac{1}{2}$ of a candy bar is shared equally by 2 children. What part of the candy bar does each one get?

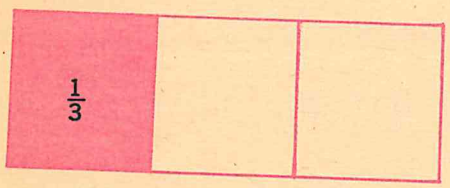


The box above stands for 1 whole. The shaded part stands for $\frac{1}{2}$. Divide each half into 2 equal parts.

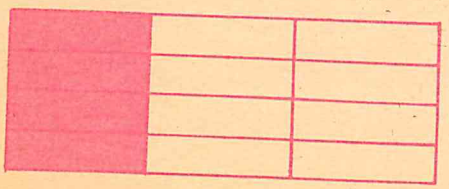


Then there are 4 equal parts in the whole. Each part is $\frac{1}{4}$. Each child gets $\frac{1}{4}$ of a bar.

Find $\frac{1}{3} \div 4$.



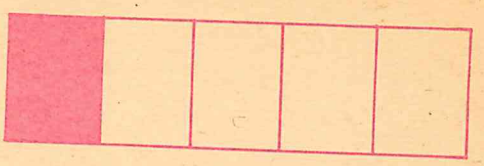
Divide each third into 4 equal parts.



Then there are ☐ equal parts in the whole. $\frac{1}{3} \div 4 = \frac{1}{\square}$

Find $\frac{1}{5} \div 2$.

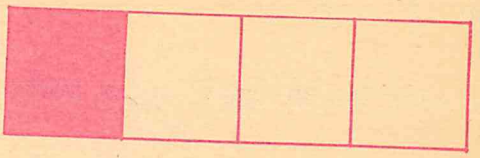
Divide each fifth into 2 equal parts.



Then there are ☐ equal parts in the whole. $\frac{1}{5} \div 2 = \frac{1}{\square}$

Find $\frac{1}{4} \div 3$.

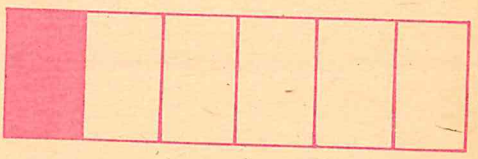
Divide each fourth into 3 equal parts.



Then there are ☐ equal parts in the whole. $\frac{1}{4} \div 3 = \frac{1}{\square}$

Find $\frac{1}{6} \div 3$.

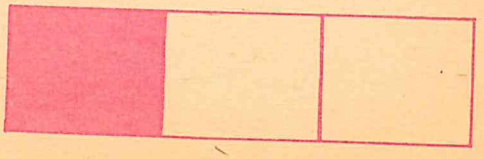
Divide each sixth into ☐ equal parts.



$\frac{1}{6} \div 3 = \frac{1}{\square}$

Find $\frac{1}{3} \div 2$.

Divide each third into ☐ equal parts.

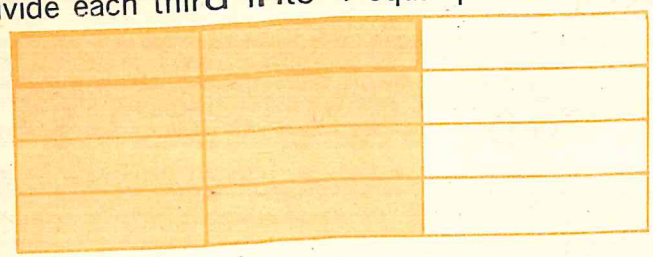


$\frac{1}{3} \div 2 = \frac{1}{\square}$

A Fraction Divided by a Whole Number

Find $\frac{2}{3} \div 4$.

Divide each third into 4 equal parts.

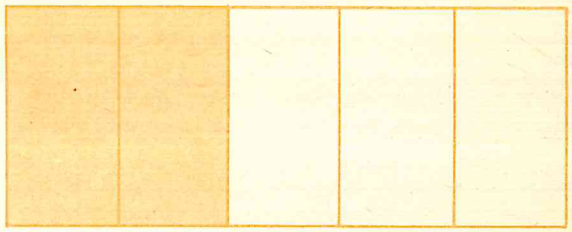


$\frac{1}{3} \div 4 = \frac{1}{12}$

$\frac{2}{3} \div 4 = 2 \times \frac{1}{12} = \frac{2}{12} = \frac{1}{6}$

Find $\frac{2}{5} \div 2$.

Divide each fifth into $\square$ equal parts.

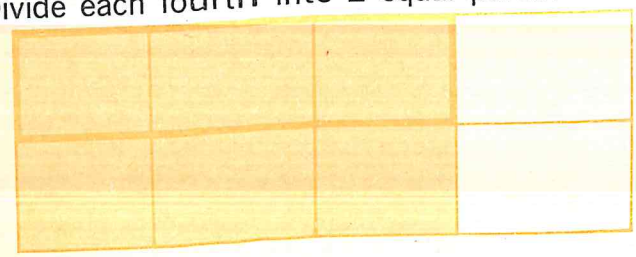


$\frac{1}{5} \div 2 = \frac{1}{\square}$

$\frac{2}{5} \div 2 = \square \times \frac{1}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$

Find $\frac{3}{4} \div 2$.

Divide each fourth into 2 equal parts.

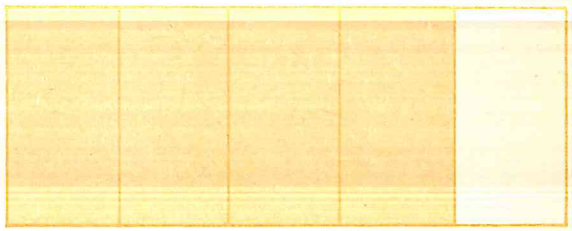


$\frac{1}{4} \div 2 = \frac{1}{\square}$

$\frac{3}{4} \div 2 = 3 \times \frac{1}{\square} = \frac{\square}{\square}$

Find $\frac{4}{5} \div 2$.

Divide each fifth into $\square$ equal parts.

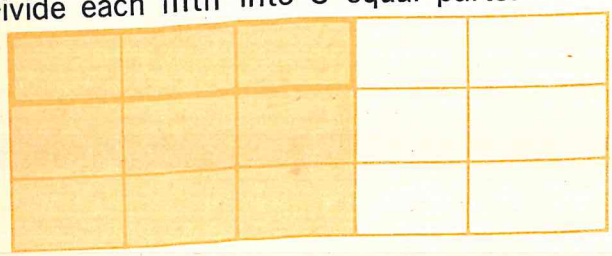


$\frac{1}{5} \div 2 = \frac{1}{\square}$

$\frac{4}{5} \div 2 = \square \times \frac{1}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$

Find $\frac{3}{5} \div 3$.

Divide each fifth into 3 equal parts.

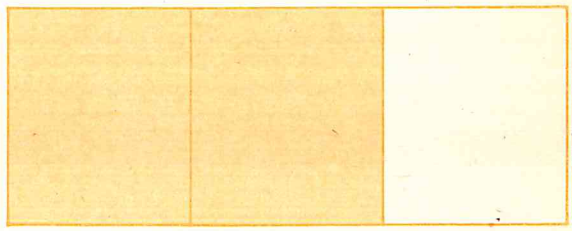


$\frac{1}{5} \div 3 = \frac{1}{\square}$

$\frac{3}{5} \div 3 = 3 \times \frac{1}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$

Find $\frac{2}{3} \div 2$.

Divide each third into $\square$ equal parts.



$\frac{1}{3} \div 2 = \frac{1}{\square}$

$\frac{2}{3} \div 2 = \square \times \frac{1}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$

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IN THIS WORKBOOK, I WILL LEARN:

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- how to work with fractions
- more about adding and subtracting
- more about multiplying and dividing
- more about Roman numerals
- more about money
- what average means
- more about clocks and calendars (more about time)
- more about weight
- more about length

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